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ABSTRACT

One of twelve individualized courses included in an automotive repair curriculum, this course covers the theory and application of methods of automotive tune-up and tests, repairs, and adjustments of components. The course is comprised of two units: (1) Fundamentals of Tune-Up and (2) Plugs and Distributor. Each unit begins with a Unit Learning Experience Guide that gives directions for unit completion. The remainder of the unit consists of Learning Activity Packages (LAP) that provide specific information for completion of a learning activity. Each LAP is comprised of the following parts: objective, evaluation procedure, resources, procedure, supplemental sheets, study guide, and a LAP test with answers. The course is preceded by a pretest which is designed to direct the student to units and performance activities. (LRA)

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MOUNTAIN PLAINS LEARNING EXPERIENCE GUIDE:

Automotive Repair.

Course: Tune-Up.

CE 017 774

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Mountain-Plains Education & Economic Development Program, Inc.
Glasgow AFB, Montana 59231

Learning Experience Guide

COURSE: TUNE-UP

DESCRIPTION:

Tune-Up covers the theory and application of methods of automotive tune-up and comprehensively covers tests, repairs and adjustments of components.

RATIONALE:

The theory and technique covered in this course will enable you to perform complete tune-ups in accordance with manufacturer's specifications.

PREREQUISITES:

.04 Electrical Systems
.05 Automotive Fuel Systems
.06 Emission Systems

OBJECTIVE:

Perform complete automotive engine tune-ups.

RESOURCES:

A resource list is attached.

GENERAL INSTRUCTIONS:

This Course has two units. Each unit has a Unit Learning Experience Guide (LEG) that gives directions for unit completion. Each unit consists of Learning Activity Packages (LAPs) that provide specific information for completion of a learning activity. Pretesting results direct the student to units and performance activities.

The general procedure for this course is as follows:

1. Read the assigned unit LEG for this course.
2. Begin and complete the first assigned LAP.
   a. Take and score the LAP test.
   b. Turn in the LAP test answer sheet.

Principal Author(s): C. Schramm

c. Determine the reason for any missed items on the LAP test.
d. Proceed to the next assigned LAP in the unit.
e. Complete all required LAPs for the unit by following steps (a) through (d).

3. Take the unit tests as described in the Unit LEG "Evaluation Procedures".
4. Proceed to the next assigned unit in this course.
5. Follow steps 1 through 4 for all required units for this course.
6. Proceed to the next assigned course.

You will work independently unless directed to do otherwise. When questions or problems arise, you are expected to discuss them with the instructor. At all times remember to follow correct safety procedures during the performance activity.

UNIT TITLES:

.01 Fundamentals of Tune-Up
.02 Plugs and Distributor

EVALUATION PROCEDURE:

Course evaluation is by pre and post testing using a multiple-choice type of test.

In this course, the course test is used as a pretest to determine which units, if any, the student may be able to validate. The student is considered validated for a particular unit if 4 out of 5 items are correctly answered for each LAP part on the course pretest and that particular unit does not have a performance test requirement.

For those units with performance test requirements, the student must also satisfactorily complete the performance test to validate that unit. Unit performance test validation procedures are given in the "Evaluation Procedure" section of the unit Learning Experience Guide (LEG).

The course test will also be taken by the student as a post test to determine any changes resulting from taking all or part of the course.

FOLLOW-THROUGH:

Go to the first Unit Learning Experience Guide (LEG) listed on your Student Progress Record (SPR).

RESOURCE LIST

Printed Materials

1. Auto Service and Repair. Martin W. Stockel, Goodheart-Willcox Company, Inc., 1969.
2. Motor's Auto Repair Manual. Motor. The Hearst Corporation, 1972 or equivalent.
3. Operator's Manuals for: electronic tester (Sun models 920 or 947 electronic tester or equivalent machine) or cylinder leakage tester, tachometer and vacuum guage.
   charging system test equipment
   volt-amp tester (Sun model 28 or equivalent)

Audio/Visuals

Super 8 Sound Films: Universal Education and Visual Arts

1. Installing External Adjustment Type Contact Points (# 7906).
2. Installing Ignition Points (# 7965).
3. Removing External Adjustment Type Contact Points (# 7905).
4. Removing Ignition Points (# 7964).
5. Replacing Points and Condenser, Pivotless Type (# 7907), (# 7908).
6. Replacing the Spark Plug Wire Terminal (# 7966).
7. Spark Plug Services (# 7904).
8. The Spark Plug (# 7963).

Equipment

1. Automobile needing: battery parts cleaned
   condenser
   charging output test
   cranking vacuum test
   cylinder leakage test
   points
   power balance check
   secondary ignition cooler tested and/or replaced
   spark plugs and spark plug service
   timing adjustment
2. Automobile with: battery
   coil
   distributor
   starter system (functioning)
3. AVT Systems Super 8 mm Instant Film Loop Player
4. Replacement parts: coil
   condenser
   points
   ignition distributor
   spark plugs
5. Safety equipment: exhaust hose

6. Supplies: baking soda and water
grease or post coater
terminal cleaner, battery

7. Test equipment: battery load tester
coil output tester
core tester
cylinder leakage guage
distributor machine
dwell meter
electronic tester, (Sun Model 920 or 947 or equivalent)
ohm meter
spark plug service machine
tachometer
timing light
volt-amp tester (Sun Model 28 or equivalent)
vacuum guage
voltmeter

8. Tools, basic hand: chisel and punch set
5/32" pin punch
3/18" solid
guage, feeler (.002" - .025")
hammer, ball peen
hammer, plastic tip
handle, speed
hex key set
pliers, diagonal cutting
pliers, needle nose
scraper, gasket
screwdriver, standard (set)
screwdriver, phillips (set)
screw starter
socket set (3/8" drive)
extension (3")
ratchet
socket set (1/4" drive)
extension (3")
handle (6" flex)
ratchet
socket, spark plug
extension (6")
wrench, combination (set)
wrench, combination ignition (set)

9. Tools, general: compressed air
fender covers
shop door
tape
wire brush

10. Tools, tune-up: battery charger
battery cable puller
point file

Student: _____ File Code: 37.07.00.00.B1-2

Date: _____ Date Published: 3-19-76

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COURSE TEST: TUNE-UP

37.07.01.01

1. When testing the coil, it is important that the coil be at what temperature?

   a. normal operting temperature.
   b. hot operating output temperature.
   c. cold operating output temperature.
   d. hot or cold operating output temperature.

2. A normal color for used ignition points would be:*

   a. dull gray
   b. silvery
   c. reddish brown
   d. deep blue

3. Point gap affects:

   a. shell bridging.
   b. splashed fouling.
   c. scavenber deposits.
   d. the coil's available voltage.

4. Cam dwell or cam angle means:*

   a. the number of degrees of distributor cam rotation form the time the points close until they open.
   b. the angle at which the rubbing lock contacts the cam.
   c. the distance between the lobes on the cam.
   d. the number of degrees of distributor cam rotation during the time the points are open.

5. Correct coil polarity can be checked by a:

   a. ohmmeter.
   b. hydrometer.
   c. tachometer.
   d. voltmeter.

*(From Auto Service and Repair, Stockel, Goodheart-Wilcox, 1969, pages 21-23 numbers 10, 15, 18, 28).

37.07.01.02

6. When making a power balance test, the engine operates on how many cylinders at a time?

   a. 1 at a time.
   b. 2
   c. all cylinders but one
   d. 4

37.07.01.03

7. At what temperature should the engine be when doing a cranking vacuum test?

   a. normal operating range.
   b. it doesn't matter what temperature it is.
   c. cold operating range.
   d. hot operating range.

8. A relatively high vacuum reading when taking a cranking vacuum test indicates:

   a. that the PCV system is plugged.
   b. that you have back pressure in your crank case.
   c. that everything is all right.
   d. that your valves are leaking air.

37.07.01.04

9. A leak in the exhaust valve can be heard in the:

   a. tail pipe.
   b. carburetor.
   c. PCV connection.
   d. plug hole of cylinder it is leaking from.

10. When testing for cylinder leakage with the piston at top dead center on the compression stroke with gauges attached and compressed air admitted, the leakage should not be more than:

   a. 30%
   b. 20%
   c. 10%
   d. 5%

37.07.01.05

11. After installing battery cables on a battery, you would do what to the terminal posts?

   a. put any kind of grease on to prevent erosion.
   b. wipe clean and dry with a rag.
   c. make sure posts are shiny and dry.
   d. put non-metallic grease on.

37.07.01.05

12. You use a wire brush to clean off the bulk of corrosion on the battery before you put on:

    a. sulphuric acid and water.
    b. electrolyte and water.
    c. water.
    d. baking soda and water.

13. When you put a battery back into a car, what kind of paint can you use?

    a. only a black plastic base paint.
    b. any kind of paint.
    c. spray type paint only.
    d. acid proof paint.

37.07.01.06

14. The battery should be at what charge state before a load test is started?

    a. almost dead, but enought to start engine.
    b. medium charge.
    c. dead charge.
    d. full charge.

15. The battery load test is the procedure of draining the battery amperage at how many times the battery amperage hour rating?

    a. 3
    b. 4
    c. 5
    d. 2

37.07.01.07

16. The number of degrees the cam rotates from the time the points close until they open again is called:

    a. cam timing.
    b. rest space.
    c. cam angle or dwell.
    d. point gap.

17. When the engine is running at 1500 RPM, the dwell should not vary more than:

    a. 7 degrees.
    b. 10 degrees.
    c. 8 degrees.
    d. 3 degrees.

37.07.01.08

18. To determine if the resistance is within specified limits on secondary wires, you use a(n):

    a. hydrometer.
    b. voltmeter.
    c. ohmmeter.
    d. oscilloscope.

19. To check for voltage output from the wiring, how far do you hold the adaptor from a good electrical grounding surface?

    a. 1"
    b. 1/2"
    c. 3/16"
    d. 3/4"

37.07.01.09

20. To check the plug wire resistance you use a(n):

    a. ammeter.
    b. voltmeter.
    c. hydrometer.
    d. ohmmeter.

21. When replacing secondary wires on a car which is subjected to heavy moisture or road slush, you should clean wires and:

    a. put electrolyte on them.
    b. put a non-metallic grease covering on them.
    c. spray with a good water proofing agent.
    d. put sulphuric acid on them.

37.07.01.10

22. When cleaning plugs you soak them in order to:

    a. avoid chipping of the insulator.
    b. avoid getting your plugs too hot.
    c. remove all oil from the plug.
    d. avoid wearing out the electrode.

37.07.01.11

23. When using a timing light, the set of marks used to time a newer model car is usually located where?

    a. front crankshaft pulley
    b. flywheel.
    c. vibration damper
    d. water pump pulley.

37.07.01.11

24. When timing most cars, you have to remove what on the distributor?

a. number one plug wire.
b. vacuum line.
c. coil plug wire.
d. vacuum advance unit.

37.07.01.12

25. The allowable voltage drop between the battery and starter in a working model should not exceed:

a. 0.5
b. 0.3
c. 0.2
d. 0.1

26. When doing a cranking voltage test, what kind of voltmeter should you use?

a. a dial indicator.
b. a high reading voltmeter.
c. a carbon pile voltmeter.
d. a low reading voltmeter.

37.07.01.13

27. When testing a generator output when the voltage reading is higher than normal battery voltage, it indicates a faulty:

a. generator.
b. cut out relay.
c. coltage relay.
d. coil.

37.07.01.14

28. When testing an ignition coil, you are checking for:

a. coil polarity.
b. ampere hour capacity.
c. available voltage.
d. ballast resistor.

29. A pattern indicating a satisfactory coil will show how many thousands of volts on an oscilloscope?

a. 4
b. 16
c. 20
d. 12

37.07.01.14

30. When testing a coil, you use an oscilloscope to determine the available voltage. Which of the following do you compare against the kilovolt scale in the left side of the scope?

a. waveform.
b. carbon tracking.
c. ballast resistance.
d. flashover.

37.07.02.01

31. When tightening plugs, it is important to have the correct torque. If you don't have enough torque, it will cause:

a. plug to over heat.
b. a change of gap.
c. plug to underheat.
d. post-ignition.

32. When removing plugs, it is important that you keep them in the correct position (the way they were taken out) so you can:

a. determine what temperature of a plug to use.
b. find all of the old plugs.
c. make sure you get all new plugs in your car.
d. identify any cylinders that are burning incorrectly.

37.07.02.02

33. If the engine was cranked after the distributor was removed, you can adjust the engine and distributor by:

a. having the nubmer one cylinder on top dead center compression stroke and rotor pointing to number one plug wire.
b. turning the engine so that the number one cylinder is ready to fire, or place rotor on number one cap tower or distributor.
c. mounting the distributor and moving the wires till you have the right firing order.
d. having the timing marks aligned on the exhaust stroke of number one and the rotor pointing to number one wire.

34. If the distributor run by the oil pump will not bottom, what is wrong?

a. distributor shaft is not aligned with crankshaft.
b. distributor shaft is not aligned with camshaft.
c. distributor shaft is not aligned with oil pumpshaft.
d. the rotor is 180 degrees off.

37.07.02.03

35. The point gap when installing points is critical. If you have the points set too close together, it will cause:

a. excessive dwell angle.
b. missing at high speeds.
c. reduction of the dwell angle

37.07.02.03 (continued)

36. Contact points are made of:

a. aluminum carbon steel
b. stainless steel
c. spring steel
d. tungsten steel.

37. If the points are too far apart, they will cause:

a. malfunction of the vacuum diaphragm.
b. arcing and burning of points.
c. missing at high speeds.
d. flooding in the carburetor because the gas is not being burned.

37.07.02.04

38. Some vacuum advance units are non-adjustable and some you can adjust by:

a. stretching the vacuum spring about 7/16 of an inch.
b. adding or removing the spacing washers on the vacuum spring.
c. putting in a stronger vacuum diaphragm.
d. advancing the distributor to compensate for spring loss.

39. When testing a vacuum advance unit, you would disconnect the vacuum line and mentally note the position of the timing marks while speeding up the engine. You would then hook the vacuum line up again and upon speeding up the engine what should happen to the timing marks?

a. they would stay the same but the engine idle will increase.
b. they would retard.
c. they would advance.
d. they would stay the same but the engine idle will decrease and engine will run more smoothly.

40. You can adjust the spring tension on a certifugal advance unit by:

a. moving the distributor to an advanced position.
b. bending the post the spring is attached to.
c. moving the distributor to a retarded position.
d. replacing the breaker plate assembly.

COURSE PRETEST ANSWER KEY: TUNE-UP

Occupational Area: _____
File Code: 37.07.00.00.B1-2
Name: Tune-Up
Family Pay Number _____ Sex M F (Circle 1)

ANSWERS

37.07.01.01	1. D _____	37.07.01.09	21. C _____	41. _____
	2. A _____	37.07.01.10	22. C _____	42. _____
	3. A _____	37.07.01.11	23. B _____	43. _____
	4. D _____		24. C _____	44. _____
	5. A _____	37.07.01.12	25. D _____	45. _____
37.07.01.02	6. D _____		26. A _____	46. _____
37.07.01.03	7. C _____	37.07.01.13	27. B _____	47. _____
	8. D _____	37.07.01.14	28. C _____	48. _____
37.07.01.04	9. B _____		29. A _____	49. _____
	10. A _____		30. C _____	50. _____
37.07.01.05	11. D _____	37.07.02.01	31. D _____	51. _____
	12. D _____		32. D _____	52. _____
	13. D _____	37.07.02.02	33. C _____	53. _____
37.07.01.06	14. A _____		34. A _____	54. _____
	15. D _____	37.07.02.03	35. D _____	55. _____
37.07.01.07	16. A _____		36. C _____	56. _____
	17. C _____		37. D _____	57. _____
37.07.01.08	18. C _____	37.07.02.04	38. B _____	58. _____
	19. D _____		39. B _____	59. _____
37.07.01.09	20. D _____		40. B _____	60. _____

UNIT TEST ANSWER SHEET

Occupational Ares: Automotive
File Code: 37.07
Name:
Family Pay Number: Sex: M F (Circle 1)

ANSWERS

0101	1.	A		21.	C	41.	
	2.	A	0110	22.	C	42.	
	3.	D	0111	23.	C	43.	
	4.	A		24.	B	44.	
	5.	D	0112	25.	A	45.	
0102	6.	C		26.	D	46.	
0103	7.	A	0113	27.	B	47.	
	8.	A	0114	28.	C	48.	
0104	9.	A		29.	C	49.	
	10.	B		30.	A	50.	
0105	11.	D	0201	31.	A	51.	
	12.	D		32.	D	52.	
	13.	D	0202	33.	A	53.	
0106	14.	D		34.	C	54.	
	15.	A	0203	35.	A	55.	
0107	16.	C		36.	D	56.	
	17.	D		37.	C	57.	
0108	18.	C	0204	38.	B	58.	
	19.	C		39.	C	59.	
0109	20.	D		40.	B	60.	

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Mountain-Plains Education & Economic Development Program, Inc.
Glasgow AFB, Montana 59231

Learning Experience Guide

UNIT: FUNDAMENTALS OF TUNE-UP

RATIONALE:

The fundamentals in this unit give you the basics necessary to perform automotive tune-up, to test and diagnose engine condition, to diagnose, adjust and repair ignition system components, to diagnose and repair distributors and components, and to test the engine operation.

PREREQUISITES:

None

OBJECTIVE:

Recognize the tests and the correct procedures for an engine tune-up. Conduct engine tests for power balance, cranking volume and cylinder leakage. Test, adjust and repair ignition system components. Recognize the correct procedure for testing, removing, replacing and adjusting of distributor and components. Recognize the correct procedure for testing of engine operation.

RESOURCES:

Auto Service and Repair, Martin W. Stockel, Goodheart-Willcox Company, Inc.
Motor's Auto Repair Manual. Motor. The Hearst Corporation. (1972 or quivalent).
Operator's Manuals for Test equipment listed below.
Time and Parts Manual.

Super 8 Sound Films: Universal Education and Visual Arts

Installing External Adjustment Type Contact Points (#7906).
Installing Ignition Points (#7965).
Removing External Adjustment Type Contact Points (#7905).
Removing Ignition Points (#7964).
Replacing Points and Condenser, Pivotless Type (#7907).
Replacing the Spark Plug Wire Terminal (#7966).
Spark Plug Services (#7904).
The Spark Plug (#7963).

Automobile needing secondary cables tested
Automobile with functioning starter system
Battery
Charge system test equipment: Battery charger
Battery load tester

Principal Author(s):

Coil
Coil output tester
Exhaust hose
Fender covers
"Sun" Electronic Tester, Model 920 or 947
"Sun" volt-amp tester, Model 28 or equivalent tester
Ohm meter

Automobile needing: timing adjustment
new spark plugs
spark plug service
secondary ignition cable replacement
cranking vacuum test
cylinder leakage test
power balance check
fender covers
electronic tester (Sun 920 or 947 electronic tester or equivalent)
tachometer
vacuum gauge
Automobile with distributor
Automobile needing new points and condenser
Distributor machine
Dwell meter
Ignition distributor
Timing Light
Automobile with battery
Baking soda and water or wire brush
Battery cable puller
Compressed air
Grease or post coater

Tools, basic hand: Chisel and Punch Set
5/32" Pin Punch
3/16" Solid

Gauge, feeler (.002" - .025")

Hammer, ball peen
Hammer, plastic tip
Handle, speed
Hex Key Set

Pliers, diagonal cutting
Pliers, needle nose

Scraper, gasket
Screwdriver, standard (Set)
Screwdriver, phillips (Set)
Screw starter

Socket Set (1/8" drive)
extension (3")
ratchet

Tools, basic hand cont.:

Socket Set (1/4" drive)
extension (3")
handle (6" flex)
ratchet

Socket, spark plug
extension (6")

Wrench, combination (Set)
Wrench, combination ignition (Set)

Voltmeter

GENERAL INSTRUCTIONS:

This unit consists of fourteen Learning Activity Packages (LAPs). Each LAP will provide specific information for completion of a learning activity.

The general procedure for this Unit is as follows:

1. Read the first assigned Learning Activity Package (LAP).
2. Begin and complete the first assigned LAP.
3. Take and score the LAP test.
4. Turn in the LAP test answer sheet
5. Determine the reason for any missed items on the LAP test.
6. Proceed to and complete the next assigned LAP in the unit.
7. Complete all required LAPs for the unit by following steps 3 through 6.
8. Take the unit tests as described in the Unit LEG "Evaluation Procedures".
9. Proceed to the next assigned unit.

PERFORMANCE ACTIVITIES:

.01 Fundamentals of Tune-Up
.02 Power Balance Test
.03 Cranking Vacuum Test
.04 Testing Cylinder Leakage
.05 Cleaning Battery Terminals
.06 Battery Load Test
.07 Setting Breaker Point Dwell
.08 Testing Secondary Cable Resistance
.09 Replacement of Secondary Ignition Cables
.10 Cleaning, Capping and Testing Spark Plugs
.11 Adjusting Ignition Timing Using a Timing Light
.12 Testing Cranking Voltage
.13 Testing Charging Output
.14 Testing Ignition Coil

EVALUATION PROCEDURE:

When pretesting:

1. The student takes the unit multiple-choice pretest.
2. Successful completion is 4 out of 5 items for each LAP part of the pretest.
3. The student then takes a unit performance test if the unit pretest was successfully completed.
4. Satisfactory completion of the performance test is meeting the criteria listed on the performance test.

When post testing:

1. The student takes a multiple-choice unit post test and a unit performance test.

2. Successful unit completion is meeting the listed criteria for the performance test.

FOLLOW-THROUGH:

Go to the first assigned Learning Activity Package (LAP) listed on your Student Progress Record (SPR).

UNIT/LAP PRETEST ANSWER KEY: FUNDAMENTALS OF TUNE-UP

LAP .01

1. a
2. a
3. d
4. c
5. a
6. a
7. a
8. a
9. c
10. d

LAP .02

11. d
12. a
13. d
14. d

LAP .03

15. c
16. d
17. d

LAP .04

18. b
19. a
20. c

LAP .05

21. d
22. d
23. d

LAP .06

24. a
25. b
26. a

LAP .07

27. a
28. b
29. c
30. b

LAP .08

31. c
32. b
33. d
34. d
35. b

LAP .09

36. d
37. c
38. c

LAP .10

39. c
40. c
41. c

LAP .11

42. a
43. c
44. d

LAP .12

45. d
46. a
47. b
48. c

LAP .13

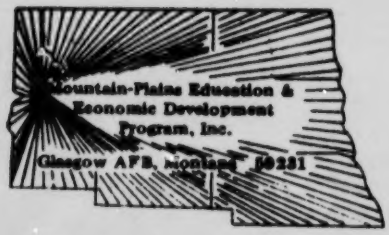
49. b
50. a
51. a

LAP .14

52. c
53. d
54. a
55. c
56. d

Student: _____ File Code: 37.07.01.00.B1-2

Date: _____ Date Published: 7/15/76



UNIT/LAP PRETEST: FUNDAMENTALS OF TUNE-UP

37.07.01.01.

*1. Excessive circuit resistance lowers:

a. voltage.
b. wears in the breaker points.
c. wears in the distributor.
d. impedence.

2. When testing the coil, it is important that the coil be at what temperature?

a. normal operating temperature.
b. hot operating output temperature.
c. cold operating output temperature.
d. hot or cold operating output temperature.

3. Spark plug center electrode polarity (coil polarity) can be reversed by:

a. reversing the coil to distributor secondary wire.
b. installing larger capacity condenser.
c. installing lower capacity condenser.
d. reversing the primary coil wire connections.

*4. Reversed coil polarity can be easily detected on the oscilloscope because the waveform will appear:

a. normal but backward.
b. backward.
c. normal but upside down.
d. right side up but with braker lines.

*5. Firing order means:

a. the order in which cylinders fire.
b. that a piston is top dead center on the firing stroke.
c. the direction the distributor turns.
d. that the plugs are clean, gapped and ready to work.

*(From Auto Service and Repair, Stockel, Goodheart-Wilcox, 1975, pp. 21-23, #s 10, 15, 18, 28.)

37.07.01.01. cont.

6. You can adjust point contact alignment by bending:

   a. the stationary point.
   b. the moveable point arm.
   c. the breaker plate.
   d. the pivot post.

*7. Cam dwell or cam angle means:

   a. the number of degrees of distributor cam rotation from the time the points close until they open.
   b. the angle at which the rubbing block contacts the cam.
   c. the distance between the lobes on the cam.
   d. the number of degrees of distributor cam rotation during the time the points are open.

8. When timing the engine with a stroboscopic light, it is often necessary to disconnect the what from the distributor?

   a. vacuum advance line.
   b. condenser.
   c. primary wire from coil.
   d. rotor.

9. Resistance type wire can be easily:

   a. refined.
   b. burnt.
   c. damaged.
   d. used on a car for the life of the motor.

10. Plug fuel fouling is indicated by what color?

   a. reddish brown.
   b. dull gray.
   c. silvery.
   d. fluffy, black carbon.

*(From Auto Service and Repair, Stockel, Goodheart-Wilcox, 1975, pp. 21-23, #s 10, 15, 18, 28.)

37.07.01.02.

11. When making a power balance test, the engine operates on how many cylinders at a time?

    a. 2
    b. 1
    c. 4
    d. all cylinders but one.

12. In a power balance test you use a vacuum gauge and a:

    a. tachometer.
    b. compression gauge.
    c. combustion efficiency analyzer.
    d. load gauge.

13. When making a cylinder balance test, the engine temperature should be:

    a. any temperature.
    b. cold temperature.
    c. hot temperature.
    d. normal temperature.

14. To effectively use the power test results, the tune-up repairman must know the engine's:

    a. compression.
    b. horsepower.
    c. condition.
    d. firing order.

37.07.01.03.

15. At what temperature should the engine be when doing a cranking vacuum test?

    a. hot operating temperature.
    b. cold operating temperature.
    c. normal operating range.
    d. it doesn't matter what temperature it is.

16. The vacuum gauge when doing a cranking vacuum test is hooked up to the:

    a. cylinder being checked.
    b. exhaust manifold.
    c. EGR valve.
    d. intake manifold.

17. When doing a cranking vacuum test, your throttle valve on the carburetor should be:

    a. partially open.
    b. fully open.
    c. partially closed.
    d. fully closed.

37.07.01.04.

18. When testing for cylinder leakage with the piston at top dead center on the compression stroke with gauges attached and compressed air admitted, the leakage should not be more than:

    a. 30%.
    b. 20%.
    c. 10%.
    d. 5%.

19. While air pressure is retained in the cylinder, listen for escaping air. A leak in the intake valve will be audible in the:

    a. carburetor.
    b. tail pipe.
    c. PCV connection.
    d. plug hole of cylinder it is leaking from.

20.

37.07.01.05.

21. You use a wire brush to clean off the bulk of corrosion before you put on:

    a. sulphuric acid and water.
    b. electralyte and water.
    c. water.
    d. baking soda and water.

22.

23.

37.07.01.06.

24. The battery load test is the procedure of draining the battery amperage at how many times the battery amperage hour rating?

    a. 3.
    b. 4.
    c. 5.
    d. 2.

37.07.01.06. cont.

25. When doing a battery load test, you drain the battery for how many seconds?

a. 5.
b. 15.
c. 30.
d. 20.

26. When doing a battery load test, the 12 volts should not drop below:

a. 9.5 volts.
b. 6.5 volts.
c. 3.5 volts.
d. 4.5 volts.

37.07.01.07.

27. The number of degrees the cam rotates from the time the points close until they open again is called:

a. cam angle or dwell.
b. rest space.
c. cam timing.
d. point gap.

28. When setting point gaps, remember that when the gap is enlarged, the point dwell:

a. increases.
b. decreases.
c. stays the same.
d. affects the carburetor gas input.

29. When the engine is running at 1500 RPM, the dwell should not vary more than:

a. 10 degrees.
b. 8 degrees.
c. 5 degrees.
d. 7 degrees.

30. Too much variation in dwell will indicate a bad:

a. coil.
b. distributor.
c. dwell gauge.
d. voltage regulator.

37.07.01.08.

31. To determine if the resistance is within specified limits on secondary wires, you use a(n):

a. hydrometer.
b. voltmeter.
c. ohmmeter.
d. ammeter.

37.07.01.08. cont.

32. To check secondary wiring, disconnect one wire at a time and crank the motor to check:

a. the starter.
b. the intensity of the spark.
c. the coil.
d. the voltage regulator.

33. To check secondary wiring you hold the adapter how far from a good electrical grounding surface?

a. 3/4".
b. 1/2".
c. 1".
d. 3/16".

34.

35.

37.07.01.09.

36. To check the plug wire resistance you use a(n):

a. ammeter.
b. voltmeter.
c. hydrometer.
d. ohmmeter.

37.

38.

37.07.01.10.

39. When cleaning plugs, you use a hand wire brush to clean:

a. the insulator.
b. the electrode.
c. the threads.
d. the plug boot.

40. When cleaning the plugs, you soak them in order to:

a. chipping of the insulator.
b. avoid getting your plug too hot.
c. remove all oil from plug.
d. wearing out the electrode.

41.

37.07.01.11.

42. What must be done first to be able to check the timing?

a. points have to be set.
b. check firing order of engine.
c. remove number one spark plug wire.
d. remove the coil wire from the distributor cap.

43. When using a timing light, the set of marks used to time a newer model car is usually located where?

a. front crankshaft pully.
b. flywheel.
c. vibration damper.
d. water pump pully.

44. To adjust the timing and make the timing marks move, you move the:

a. coil-just a little.
b. idle speed.
c. vibration damper.
d. distributor.

37.07.01.12.

45. When doing a cranking voltage test, what kind of voltmeter should you use?

a. a dial indicator.
b. a high reading voltmeter.
c. a carbon pile voltmeter.
d. a low reading voltmeter.

37.07.01.12. cont.

46.

47. When you hook a voltmeter across a BAT terminal and the SWITCH terminal on the solenoid, it will detect excessive drop in:

a. the battery circuit.
b. the switch circuit.
c. the solenoid circuit.
d. the starter circuit.

48. When doing a cranking voltage test, you shouldn't crank the starter over:

a. one minute.
b. 10 seconds.
c. 30 seconds.
d. two minutes.

37.07.01.13.

49. The gauges you use when testing the output of a generator are an ammeter, a tachometer and a:

a. hydrometer.
b. voltmeter.
c. voltage regulator.
d. dial indicator.

50. When checking the charging output of a generator, the engine RPM should not exceed:

a. 1,500 RPM.
b. 500 RPM.
c. 1,000 RPM.
d. 200 RPM.

51. In testing the generator output a safety device installed in the field circuit to control maximum voltage is a:

a. variable resistance unit.
b. voltage regulator.
c. voltmeter.
d. ammeter.

37.07.01.14.

52. When testing an ignition coil, you are checking for:

a. carbon tracking.
b. coil polarity.
c. available voltage.
d. ballast resistor.

37.07.01.14. cont.

53. To test a coil the temperature should be:

a. any temperature.
b. at hot operating temperature.
c. at cold operating temperature.
d. at normal operating temperature.

54. When testing a coil, you use an oscilloscope to determine the available voltage by comparing which of the following against the kilovolt scale on left side of the scope?

a. waveform.
b. ballast resistance.
c. carbon tracking.
d. flashover.

55. A pattern indicating a satisfactory coil will show many thousands of volts on an oscilloscope?

a. 4.
b. 12.
c. 20.
d. 16.

56. When you have an open coil primary circuit, the oscilloscope will show a reading of:

a. 12.
b. 4 to 6.
c. 0 to 20.
d. 0.

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Mountain-Plains Education & Economic Development Program, Inc.
Glasgow AFB, Montana 59231

Learning Activity Package

Student: _____

Date: _____

PERFORMANCE ACTIVITY: Fundamentals of Tune-Up

OBJECTIVE:

Recognize the correct procedures and tests for automotive engine tune-up.

EVALUATION PROCEDURE:

80% accuracy on LAP study questions.
Score with 80% accuracy on a multiple-choice objective test.

RESOURCES:

Auto Service and Repair, Stockel.

PROCEDURE:

1. Obtain a text copy and secure a quiet place to study.
2. Read Chapter 21, "Ignition System Service" beginning on page 21-1 through 21-33.
3. Study the figures 21-1 through 21-82 closely.
4. On separate paper, neatly answer the questions 1 through 54 on pages 21-33 and 21-34.
5. When completed, give answer sheet to the instructor for evaluation.
6. Return to the proper shelf.
7. Take and score the Unit/LAP post test.

Principal Author(s): J. Anderson/W. Osland

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Mountain-Plains Education & Economic Development Program, Inc.
Glasgow AFB, Montana 59231

Learning Activity Package

Student: _____

Date: _____

PERFORMANCE ACTIVITY: Power Balance Test

OBJECTIVE:

Perform the power balance test.

EVALUATION PROCEDURE:

80% correct on LAP performance.

RESOURCES:

Motor's Auto Repair Manual. The Hearst Corporation (1972 or equivalent).
Operator's Manual for tachometer or electronic tester

Automobile
Fender covers
Tachometer or electronic tester

PROCEDURE:

1. Place fender covers.
2. Obtain the operator's manual for electronic tester (find the power balance procedure page).
3. Follow the recommended step-by-step procedure for hook-up and test operation. Use the repair manual to find the correct firing order and cylinder placement.
4. Record the results on the work order.
5. Have the instructor check your finished recorded results.
6. Return all equipment.
7. Proceed to the next LAP.

Principal Author(s): J. Anderson/W. Osland

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Mountain-Plains Education & Economic Development Program, Inc.
Glasgow AFB, Montana 59231

Learning Activity Package

Student: _____

Date: _____

PERFORMANCE ACTIVITY: Cranking Vacuum Test

OBJECTIVE:

Demonstrate the correct procedure to perform the cranking vacuum test.

EVALUATION PROCEDURE:

80% correct on LAP performance.

RESOURCES:

Auto Service and Repair. Martin W. Stockel, Goodheart-Willcox Company, Inc.
Motor's Auto Repair Manual. Motor. The Hearst Corporation (1972 or equivalent).
Operator's Manual for vacuum gauge

Fender covers
Tachometer
Vacuum gauge
Tools, basic hand: (See Unit LEG)

PROCEDURE:

NOTE: Read pages 23-5 through 23-7 in Auto Service and Repair.

1. Obtain the operator's manual. Find the "Cranking Vacuum Test Procedure" in the manual.
2. Follow the step-by-step procedure of hook-up and perform the test.
3. Record results on the work order.
4. Find the repair manual's recommended cranking vacuum and compare with results of test.
5. Ask the instructor to evaluate your work.
6. Clean and return all equipment.
7. Proceed to the next LAP.

Principal Author(s): J. Anderson/W. Osland

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Mountain-Plains Education & Economic Development Program, Inc.
Glasgow AFB, Montana 59231

Learning Activity Package

Student: _____

Date: _____

PERFORMANCE ACTIVITY: Testing Cylinder Leakage

OBJECTIVE:

Demonstrate the correct procedure to perform a cylinder leakage test.

EVALUATION PROCEDURE:

80% correct on LAP performance.

80% accuracy on multiple-choice test.

RESOURCES:

Operator's Manual for Electronic tester
Auto Service and Repair, Stockel.
Cylinder leakage tester or electronic tester
Fender covers
Paper
Tools, basic hand: (See Unit LEG)

PROCEDURE:

NOTE: Read pages 23-4 "Cylinder Leakage Detector" in Auto Service and Repair.

1. Obtain the operator's manual and refer to the page of cylinder leakage test procedure.
2. Place fender covers.
3. Following the hook-up procedure, carefully connect the test equipment.
4. Follow the step-by-step procedure recommended in the manual.
5. Record results on the work order.
6. Upon completion, ask the instructor to evaluate your work.
7. Return all equipment.
8. Obtain a copy of the unit/LAP test. Answer all of the questions and return the test to the instructor for evaluation.
9. Upon successful completion, proceed to the next unit.

Principal Author(s): J. Anderson/W. Osland

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Mountain-Plains Education & Economic Development Program, Inc.
Glasgow AFB, Montana 59231

Learning Activity Package

Student: _____

Date: _____

PERFORMANCE ACTIVITY: Cleaning Battery Terminals

OBJECTIVE:

Demonstrate the correct procedure to clean the battery post terminals and cable connectors.

EVALUATION PROCEDURE:

80% accuracy on LAP performance.

RESOURCES:

Auto Service and Repair. Stockel.

Automobile needing the battery posts cleaned
Battery cable remover
Battery terminal cleaner
Baking soda and water or hand wire brush
Tools, basic hand: (See Unit LEG)
Post coater or grease

PROCEDURE:

NOTE: Read page 22-2 in Auto Service and Repair.

1. Place fender covers.
2. Sprinkle baking soda on the corroded posts and add a small amount of water to the powder. (Chemical action will remove the corrosion.) If baking soda is unavailable, use a hand wire brush and carefully brush away the corrosion.
3. Loosen the cable clamp bolts. Remove the negative cable first!
4. Using the post and cable cleaner, clean the post and the cables.
5. Re-install the cables. Positive cable first and secure the clamp bolts properly.
6. Upon completion, ask the instructor to evaluate your work.
7. Return all equipment.
8. Proceed to the next LAP.

NOTE: Acid will ruin clothing and paint.

Principal Author(s): J. Anderson/W. Osland

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Mountain-Plains Education & Economic Development Program, Inc.
Glasgow AFB, Montana 59231

Learning Activity Package

Student: _____

Date: _____

PERFORMANCE ACTIVITY: Battery Load Test

OBJECTIVE:

Demonstrate the correct procedure to perform the battery load test.

EVALUATION PROCEDURE:

80% correct on LAP performance.

RESOURCES:

Auto Service and Repair. Stockel
Operator's Manual for charging system test equipment

Battery
Battery charger
Battery load tester
Fender covers
Tools, basic hand: (See Unit LEG)

PROCEDURE:

NOTE: Read pages 22-5 Capacity (Load) Test in Auto Service and Repair.

1. Place fender covers.
2. Disconnect battery cables. Remember: negative cable first.
3. Be sure the battery is in a fully charged state. (If not, charge on the battery charger for 20-30 minutes.)
4. Following the tester's operator's manual, make the proper connections and perform the results.
5. Record results on work order.
6. Demonstrate the test to the instructor for evaluation.
7. Clean the battery connections and reconnect cables. (Positive cable first.)
8. Clean and return all tools and equipment.
9. Proceed to the next LAP.

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Mountain-Plains Education & Economic Development Program, Inc.
Glasgow AFB, Montana 59231

Learning Activity Package

Student: _____

Date: _____

PERFORMANCE ACTIVITY: Setting Breaker Point Dwell

OBJECTIVE:

Demonstrate correct procedure to set the breaker point dwell in an automobile.

EVALUATION PROCEDURE:

80% correct on LAP performance.

80% accuracy on multiple-choice test.

RESOURCES:

Auto Service and Repair, Stockel.
Motor's Auto Repair Manual.

Dwell meter
Fender covers
Tools, basic hand: (See Unit LEG)

PROCEDURE:

NOTE: Read pages 21-13 and 21-14 in Auto Service and Repair.

1. Look up specifications and record the cam angle and idle RPM's for the engine being worked on.
2. Place fender covers on fenders.
3. Manually adjust the dwell meter needle to zero by using the small black knob on the face of the meter below the needle.
4. If battery powered meter is being used, connect meter leads together. Turn calibrate control until needle is on the "set line".
5. Connect the RED lead of the meter to the distributor primary terminal. NOTE: Coil end of wire may be used.
6. Connect the BLACK lead to a good ground connection. CAUTION: Arrange leads so they are away from the fan.
7. Set tach range control to highest scale.
8. Set dwell control to the correct number of cylinders.

Principal Author(s): J. Anderson/W. Osland

9. Turn meter control to RESISTANCE position.
10. Turn ignition switch on.
    NOTE: Points must be completely closed. Turn engine over until they are.
11. Read meter. Needle should be in GOOD or BLACK part of scale.
    NOTE: If needle is in red, there is too much resistance. This may be caused by poor point contact; or bad connections on breaker plate ground wire.
12. Start engine and adjust to RPM listed in Step No. 1.
13. Read dwell meter. Compare reading with specifications listed in No. 1.
    NOTE: If dwell is off, points must be adjusted.
14. Remove distributor cap and rotor. Loosen points, change gap and tighten points.
    NOTE: If dwell was too big -- open point gap. If dwell was too small -- decrease point gap.
15. Replace distributor cap and rotor. New model cars (since 1960) have an external point adjustment and may be adjusted while the engine is running.
16. Start engine and check dwell.
    NOTE: If still off, repeat steps 10 and 11. When set correct, have the instructor check your work.
17. Turn engine off.
18. Disconnect meter leads.
19. Ask the instructor to evaluate your work.
20. Remove tools and fender covers.
21. Obtain a copy of unit/LAP post test. Answer all of the questions and return the test to the instructor for evaluation.
22. Upon successful completion, proceed to the next unit.

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Date Published: 7/15/76

Mountain-Plains Education & Economic Development Program, Inc.
Glasgow AFB, Montana 59231

Learning Activity Package

Student: _____

Date: _____

PERFORMANCE ACTIVITY: Testing Secondary Cable Resistance

OBJECTIVE:

Demonstrate the correct procedure for testing the secondary ignition cables.

EVALUATION PROCEDURE:

Secondary wire testing to be evaluated by the instructor in accordance with manufacturer's specifications.

RESOURCES:

Auto Service and Repair. Stockel.
Motor's Auto Repair Manual.
Operator's Manual for Ohm meter

Automobile needing secondary cables tested
Fender covers
Ohm meter
Tools, basic hand: (See Unit LEG)

PROCEDURE:

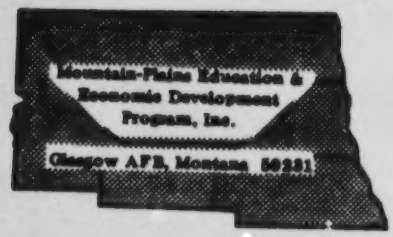
NOTE: Read pages 21-7 in Auto Service and Repair.

1. Obtain the test procedure in the operator's manual for testing secondary cable resistance.
2. Record both the manufacturer's recommended specifications and the test results on the work order.
3. Follow the step-by-step test procedure.
4. Upon completion, have the instructor evaluate your work.
5. If new cables are available, replace the defective ones. If not, record needed cables in the proper space of the work order.
6. Return all equipment and clean work area.

Principal Author(s): J. Anderson/W. Osland

File Code: 37.07.01.08.B1-2

Date Published: 7/16/76



LAP TEST: TESTING SECONDARY CABLE RESISTANCE

1. To determine if the resistance is within specified limits on secondary wires, you use a(n):

   a. hydrometer.
   b. voltmeter.
   c. ohmmeter.
   d. ammeter.

2. To check secondary wiring, disconnect one wire at a time and crank the motor to check:

   a. the starter.
   b. the intensity of the spark.
   c. the coil.
   d. the voltage regulator.

3. To check secondary wiring you hold the adapter how far from a good electrical grounding surface:

   a. 3/4".
   b. 1/2".
   c. 1".
   d. 3/16".

LAP TEST: TESTING SECONDARY CABLE RESISTANCE

1. c
2. b
3. d

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Mountain-Plains Education & Economic Development Program, Inc.
Glasgow AFB, Montana 59231

Learning Activity Package

Student: _____

Date: _____

PERFORMANCE ACTIVITY: Replacement of Secondary Ignition Cables

OBJECTIVE:

Demonstrate the correct procedure for replacing the secondary ignition cables.

EVALUATION PROCEDURE:

80% accuracy on LAP performance.

RESOURCES:

Auto Service and Repair. Stockel.

Automobile needing secondary ignition cables replaced
Fender covers
New secondary cables
Tools, basic hand: (See Unit LEG)

Filmstrip: Universal Education and Visual Arts

Replacing the Spark Plug Wire Terminal (#7966).

PROCEDURE:

NOTE: View filmstrips.

Read pages 21-7 in Auto Service and Repair.

1. Place fender covers on fenders.
2. Remove number one plug wire.
3. Clean distributor cap terminal with brush.
4. Cut a new wire to length.
   NOTE: Use old wire as a guide for length.
5. Put connector(s) on end of new wire.
   NOTE: Solder if necessary.
6. Install new wire on number one plug.
   NOTE: Use all holders and brackets provided.
7. Repeat above procedure for other secondary wires.
   NOTE: Do one wire at a time.
8. Upon completion, start engine to check for proper operation.
9. Ask the instructor to observe the operation of the engine and your completed work.
10. Proceed to the next LAP.

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Mountain-Plains Education & Economic Development Program, Inc.
Glasgow AFB, Montana 59231

Learning Activity Package

Student: _____

Date: _____

PERFORMANCE ACTIVITY: Cleaning, Gapping, and Testing Spark Plugs

OBJECTIVE:

Demonstrate the proper procedure for cleaning, adjusting and testing of spark plugs.

EVALUATION PROCEDURE:

80% correct on LAP performance.
80% accuracy on written test.

RESOURCES:

Auto Service and Repair. Stockel.

Automobile needing the plugs serviced
Fender covers
Point file
Spark plug cleaning machine
Tools, basic hand: (See Unit LEG)

PROCEDURE:

NOTE: Read pages 21-23 through 21-28 in Auto Service and Repair.

1. Place fender covers.
2. Remove the spark plugs according to the correct procedure.
3. Clean the spark plugs with the abrasive plug cleaning machine.
4. Using a point file, carefully file the inner and outer electrodes to make their surfaces even.
5. Using a plug gap gauge, correctly reset the gaps to meet the required specification from the repair manual.
6. Test spark plugs firing under pressure on the spark plug machine. Record results on work order. Replace plugs that cannot fire under the required pressure.
7. Show the cleaned plugs to the instructor for evaluation.

Principal Author(s): J. Anderson/W. Osland

8. Re-install the plugs using the correct procedure.
9. Connect the spark plug cables in their proper order.
10. Operate engine to check that the engine operates smoothly.
11. Clean and return all tools and equipment.
12. Clean work area.
13. Obtain a copy of the unit/LAP post test. Answer all of the questions and return the test to the instructor for evaluation.
14. Upon successful completion, proceed to the next unit.

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Mountain-Plains Education & Economic Development Program, Inc.
Glasgow AFB, Montana 59231

Learning Activity Package

Student: _____

Date: _____

PERFORMANCE ACTIVITY: Adjusting Ignition Timing Using a Timing Light

OBJECTIVE:

Demonstrate the proper procedure to adjust ignition timing.

EVALUATION PROCEDURE:

80% accuracy on LAP performance.

RESOURCES:

Motor's Auto Repair Manual

Automobiles needing timing adjustment
Fender covers
Tools, basic hand: (See Unit LEG)
Shop cloth
Tape
Timing light

PROCEDURE:

1. Look up specifications for your engine. These include location, where set at, idle RPM, and dwell angle.
2. Place fender covers on fenders.
3. Find mark and clean with shop rag.
4. Put chalk on pointer and timing mark.
5. Check idle RPM and dwell angle.
   NOTE: Adjust if necessary.
6. Disconnect vacuum line. Cover end of line with tape.
   NOTE: Plug line so manifold will not have air leak.
7. Disconnect number one plug wire. Put adapter on plug.
8. Connect number one plug to wire adapter.
9. Connect timing light: RED to battery positive; BLACK to battery negative; BLUE to adapter on number one plug. CAUTION: Be sure timing light leads are clear of fan.

Principal Author(s): J. Anderson/W. Osland

10. Start engine and run at idle RPM.
11. Point timing light at timing marks. CAUTION: Do not let the end of the timing light hit the fan.
12. Observe mark location when light flashes.
    NOTE: Mark and pointer should be in line. If they are not, loosen distributor hold-down bolt.
13. Slowly turn distributor and watch timing marks are in line.
    NOTE: Recheck timing after tightening hold-down bolts.
14. Untape and then connect vacuum line.
15. Ask the instructor to evaluate your work.
16. Clean timing light, leads and tools and put them away.
17. Remove fender covers.
18. Proceed to the next LAP.

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Mountain-Plains Education & Economic Development Program, Inc.
Glasgow AFB, Montana 59231

Learning Activity Package

Student: _____

Date: _____

PERFORMANCE ACTIVITY: Testing Cranking Voltage

OBJECTIVE:

Demonstrate the correct procedure for testing the cranking voltage.

EVALUATION PROCEDURE:

80% correct on LAP performance.
80% accuracy on written test.

RESOURCES:

Motor's Auto Repair Manual.
Operator's Manual for test equipment

Automobile with functioning starter system
Fender covers
Test equipment for starter system
Tools, basic hand: (See Unit LEG)
Voltmeter

PROCEDURE:

1. Place fender covers.
2. Attach test equipment according to the operator's manual procedure.
3. Perform test according to the proper procedure.
4. Record results on work order. Compare results to the repair manual's specifications.
5. Ask the instructor to evaluate your work.
6. Clean and return all tools and equipment.
7. Clean work area.
8. Proceed to the next LAP.

Principal Author(s): J. Anderson/W. Osland

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Mountain-Plains Education & Economic Development Program, Inc.
Glasgow AFB, Montana 59231

Learning Activity Package

Student: _____

Date: _____

PERFORMANCE ACTIVITY: Testing Charging Output

OBJECTIVE:

Demonstrate the correct procedure to test the charging output of charging system.

EVALUATION PROCEDURE:

80% correct on LAP performance.

RESOURCES:

Motor's Auto Repair Manual.
Operator's Manual for test equipment

Automobile
Charging system test equipment
Fender covers

PROCEDURE:

1. Obtain the testing procedure from the operator's manual for the testing equipment.
2. Obtain the specifications from a repair manual and record on the work order.
3. Place fender covers over the fenders.
4. Follow the step-by-step procedure outline in the operator's manual to perform the tests.
5. After you have completed the test and recorded the results, ask the instructor to evaluate your work.
6. Clean and return all equipment.
7. Clean work area.
8. Proceed to the next LAP.

Principal Author(s): J. Anderson/W. Osland

File Code: 37.07.01.14.B1-0

Date Published: 3/8/76

Mountain-Plains Education & Economic Development Program, Inc.
Glasgow AFB, Montana 59231

Learning Activity Package

Student: _____

Date: _____

PERFORMANCE ACTIVITY: Testing Ignition Coil

OBJECTIVE:

Demonstrate the correct procedure for testing the ignition coil.

EVALUATION PROCEDURE:

80% correct on LAP performance.

RESOURCES:

Auto Service and Repair. Stockel.
Motor's Auto Repair Manual

Coil
Coil output tester
Fender covers
Tools, basic hand: (See Unit LEG)

PROCEDURE:

NOTE: Read pages 21-4 and 21-5 in Auto Service and Repair.

1. Locate the coil's manufacturer's output recommended specification from the repair manual.
2. Locate and open the operator's manual to the coil-test procedure and follow the prescribed steps.
3. Place fender covers. Record test results and the specifications on the work order.
4. When able to complete the test satisfactorily, have the instructor observe your test operation for proper evaluation.
5. Return all items properly.
6. Proceed to next LAP.

NOTE: The test can be done with the coil in or out of the car.

Principal Author(s): J. Anderson/W. Osland

Student: _____ File Code: 37.07.01.00.C1-2(A)

Date: _____ Date Published: 4-9-79

UNIT/LAP POST TEST: FUNDAMENTALS OF TUNE-UP (A)

37.07.01.01

1. Correct coil polarity can be checked by a:

   a. ohmmeter.
   b. hydrometer.
   c. tachometer.
   d. voltmeter.

2. Spark plug center electrode polarity (coil polarity) can be reversed by:

   a. reversing the coil to distributor secondary wire.
   b. installing larger capacity condenser.
   c. installing lower capacity condenser.
   d. reversing the primary coil wire connections.

*3. Firing order means:

   a. the order in which cylinders fire.
   b. that a piston is top dead center on the firing stroke.
   c. the direction the distributor turns.
   d. that the plugs are clean, gapped and ready to work.

*4. A normal color for ignition points would be:

   a. dull gray.
   b. silvery.
   c. reddish brown.
   d. deep blue.

5. Point gap affects:

   a. shell bridging.
   b. splashed fouling.
   c. scavenger deposits.
   d. the coil's available voltage.

*6. Cam dwell or cam angle means:

   a. the number of degrees of distributor cam rotation from the time the points close until they open.

   b. the angle at which the rubbing block contacts the cam.
   c. the distance between the lobes on the cam.
   d. the number of degrees of distributor cam rotation during the time the points are open.

*(Adapted from Auto Service and Repair, Stockel, Goodheart-Wilcox, 1975, pp. 21-23, #s 10, 15, 18, 28).

37.07.01.01 (continued)

7. Resistance type wire can be easily:

   a. refined.
   b. burnt.
   c. damaged.
   d. used on a car for the life of the motor.

8. You should lubricate the distributor cam with:

   a. high temperature grease.
   b. low temperature grease.
   c. light oil.
   d. heavy oil.

9. A condenser that is not functioning properly can cause:

   a. fouling of the plugs.
   b. fouling of the vacuum advance.
   c. heavy arcing of points.
   d. burning of rotor.

10. Plug fuel fouling is indicated by what color?

   a. reddish brown.
   b. dull gray.
   c. silvery.
   d. fluffy, black carbon.

37.07.01.02

11. When working a power balance test, the engine operates on how many cylinders at a time?

   a. 2
   b. 1
   c. 4
   d. all cylinders but one

12. In a power balance test you use a vacuum gauge and a:

   a. tachometer.
   b. compression gauge.
   c. combustion efficiency analyzer.
   d. load gauge.

37.07.01.03

13. At what temperature should an engine be when doing a cranking vacuum test?

   a. hot operating range.
   b. cold operating range.
   c. normal operating range.
   d. it doesn't matter what temperature it is.

37.07.01.03 (continued)

14. When doing a cranking vacuum test, your throttle valve on the carburetor should be:

    a. partially open.
    b. fully open.
    c. partially closed.
    d. fully closed.

15. A relatively high vacuum reading when taking a cranking vacuum test indicates:

    a. that your valves are leaking air.
    b. that the PCV system is plugged.
    c. that you have back pressure in your crankcase.
    d. everything is all right.

37.07.01.04

16. While air pressure is retained in the cylinder, listen for escaping air. A leak in the intake valve will be audible in the:

    a. carburetor.
    b. tail pipe.
    c. PCV connection.
    d. plug hole of cylinder it is leaking from.

17. A leak in the exhaust valve can be heard in the:

    a. tail pipe.
    b. carburetor.
    c. PCV connection.
    d. plug hole of cylinder it is leaking from.

18. A leakage past the rings will be audible at the:

    a. tail pipe.
    b. PCV connection
    c. carburetor.
    d. plug hole of cylinder it is leaking from.

37.07.01.05

19. You use a wire brush to clean off the bulk of corrosion before you put on:

    a. sulphuric acid and water.
    b. electrolyte and water.
    c. water.
    d. baking soda and water.

20. You would brighten terminal posts with a wire brush or:

    a. dry cloth.
    b. knife.
    c. anything that is handy.
    d. sandpaper.

37.07.01.06

21. The battery load test is the procedure of draining the battery amperage at how many times the battery amperage hour rating?

a. 3
b. 4
c. 5
d. 2

22. When doing a battery load test, you drain the battery for how many seconds?

a. 5
b. 15
c. 30
d. 20

23. When doing a battery load test, the 12 volts should not drop below:

a. 9.5 volts
b. 6.5 volts
c. 3.5 volts
d. 4.5 volts

37.07.01.07

24. The number of degrees the cam rotates from the time the points close until they open again is called:

a. cam angle or dwell.
b. rest space.
c. cam timing.
d. point gap.

25. When setting point gaps, remember that when the gap is enlarged, the point dwell:

a. increases.
b. decreases.
c. stays the same.
d. affects the carburetor.

26. When the engine is running at 1,500 RPM, the dwell should not vary more than:

a. 10 degrees.
b. 8 degrees.
c. 2 degrees to 3 degrees.
d. 7 degrees.

27. Too much variation in dwell will indicate trouble in the:

a. coil.
b. distributor.
c. dwell gauge.
d. voltage regulator.

37.07.01.08

28. To determine if the resistance is within specified limits on secondary wires, you use a(n):

    a. hydrometer.
    b. voltmeter.
    c. ohmmeter.
    d. ammeter.

29. To check secondary wiring, disconnect one wire at a time and crank the motor to check:

    a. the starter
    b. the intensity of the spark.
    c. the coil.
    d. the voltage regulator.

30. To check secondary wiring you hold the adapter how far from a good electrical grounding surface?

    a. 3/4"
    b. 1/2"
    c. 1"
    d. 3/16"

31. The maximum resistance of a carbon wire is how many ohms?

    a. 10 thousand.
    b. 15 thousand.
    c. 5 thousand.
    d. 40-50 thousand.

32. Copper wire resistance should not be over how many ohms.

    a. 10
    b. 1
    c. 20
    d. 15

37.07.01.09

33. To check the plug wire resistance you use a(n):

    a. ammeter.
    b. voltmeter.
    c. hydrometer.
    d. ohmmeter.

37.07.01.10

34. When cleaning plugs, you use a hand wire brush to clean:

    a. the insulator.
    b. the electrodes.
    c. the threads.
    d. the plug boot.

37.07.01.10 (continued)

35. You test a plug on the cleaning machine for:

    a. broken insulator.
    b. broken electrode.
    c. weak spark.
    d. correct resistance.

37.07.01.11

36. When timing most cars, you have to remove what on the distributor?

    a. number one plug wire.
    b. vacuum line.
    c. coil plug wire.
    d. vacuum advance unit.

37. What must be done first to be able to check the timing?

    a. points have to be set.
    b. check firing order of engine.
    c. remove number one spark plug wire.
    d. remove the coil wire from the distributor cap.

38. When using a timing light, the set of marks used to time a newer model car is usually located where?

    a. front crankshaft pully.
    b. flywheel.
    c. vibration damper.
    d. water pump pully.

37.07.01.12

39. When doing a cranking voltage test, what kind of voltmeter should you use?

    a. a dial indicator.
    b. a high reading voltmeter.
    c. a carbon pile voltmeter.
    d. a low reading voltmeter.

40. The allowable voltage drop between the battery and starter in a working model should not exceed:

    a. 0.5.
    b. 0.3.
    c. 0.2.
    d. 0.1.

41. When you hook a voltmeter across a BAT terminal and the SWITCH terminal on the solenoid, it will detect excessive drop in:

    a. the battery circuit.
    b. the switch circuit.
    c. the solenoid circuit.
    d. the starter circuit.

37.07.01.12 (continued)

42. When doing a cranking voltage test, you shouldn't crank the starter over:

a. one minute.
b. ten seconds.
c. thirty seconds.
d. two minutes.

37.07.01.13

43. The gauges you use when testing the output of a generator are an ammeter, a tachometer and a:

a. hydrometer.
b. voltmeter.
c. voltage regulator.
d. dial indicator.

44. When checking the charging output of a generator, the engine RPM should not exceed:

a. 1,500 RPM.
b. 500 RPM.
c. 1,000 RPM.
d. 200 RPM.

45. In testing the generator output a safety device installed in the field circuit to control maximum voltage is a:

a. variable resistance unit.
b. voltage regulator.
c. voltmeter.
d. ammeter.

37.07.01.14

46. When testing an ignition coil, you are checking for:

a. carbon tracking.
b. coil polarity.
c. available voltage.
d. ballast resistor.

47. To test a coil the temperature should be:

a. any temperature.
b. at hot operating temperature.
c. at cold operating temperature.
d. at normal operating temperature.

48. When testing a coil, you use an oscilloscope to determine the available voltage by comparing which of the following against the kilovolt scale on left side of the scope?

a. waveform.
b. ballast resistance.
c. carbon tracking.
d. flashover.

37.07.01.14 (continued)

49. A pattern indicating a satisfactory coil will show how many thousands of volts on an oscilloscope?

a. 4
b. 12
c. 20
d. 16

50. When you have an open coil primary circuit, the oscilloscope will show a reading of:

a. 12
b. 4 to 6
c. 0 to 20
d. 0

UNIT/LAP POST TEST: FUNDAMENTALS OF TUNE-UP (A)

1.	D	26.	C
2.	D	27.	B
3.	A	28.	C
4.	A	29.	B
5.	D	30.	D
6.	A	31.	D
7.	C	32.	B
8.	A	33.	D
9.	C	34.	C
10.	D	35.	C
11.	D	36.	B
12.	A	37.	A
13.	C	38.	C
14.	D	39.	D
15.	D	40.	A
16.	A	41.	B
17.	A	42.	C
18.	B	43.	B
19.	D	44.	A
20.	D	45.	A
21.	A	46.	C
22.	B	47.	D
23.	A	48.	A
24.	A	49.	C
25.	B	50.	D

Student: _____ File Code: 37.07.01.00.C1-2-B

Date: _____ Date Published: 5-11-77

UNIT/LAP POST TEST: FUNDAMENTALS OF TUNE-UP (B)

37.07.01.01

1. Plug fuel fouling is indicated by what color?

   a. reddish brown
   b. dull gray
   c. silvery
   d. fluffy, black carbon

2. A condenser that is not proper can cause:

   a. fouling of the plugs.
   b. fouling of the vacuum advance
   c. heavy arcing of points
   d. burning of rotor.

3. You should lubricate the distributor cam with:

   a. high temperature grease.
   b. low temperature grease.
   c. light oil.
   d. heavy oil.

4. Resistance type wire can be easily:

   a. refined
   b. burnt
   c. damaged
   d. used on a car for the life of the motor

*5. Cam dwell or cam angle means:

   a. the number of degrees of distributor cam rotation from the time the points close until they open.
   b. the angle at which the rubbing block contacts the cam.
   c. the distance between the lobes on the cam.
   d. the number of degrees of distributor cam rotation during the time the points are open.

*(Adapted from Auto Service and Repair, Stockel, Goodheart-Wilcox, 1975, pp. 21-23, #s 10, 15, 18, 28.)

6. Point gap affects:

   a. shell bridging
   b. splashed fouling
   c. scavenger deposits
   d. the coil's available voltage

*7. A normal color for ignition points would be:

   a. dull gray
   b. silvery
   c. reddish brown
   d. deep blue

*8. Firing order means:

   a. the order in which cylinders fire.
   b. that a piston is top dead center on the firing stroke.
   c. the direction the distributor turns.
   d. that the plugs are clean, gapped and ready to work.

9. Spark plug center electrode polarity (coil polarity) can be reversed by:

   a. reversing the coil to distributor secondary wire.
   b. installing larger capacity condenser.
   c. installing lower capacity condenser.
   d. reversing the primary coil wire connections.

10. Correct coil polarity can be checked by a:

   a. ohmmeter
   b. hydrometer
   c. tachometer
   d. voltmeter

37.07.01.02

11. In a power balance test you use a vacuum gauge and a:

   a. tachometer
   b. compression gauge
   c. combustion efficiency analyzer
   d. load gauge

12. When working a power balance test, the engine operates on how many cylinders at a time?

   a. 2
   b. 1
   c. 4
   d. all cylinders but one

*(From Auto Service and Repair, Stockel, Goodheart-Wilcox, 1975, pp. 21-23, #s 10, 15, 18, 28).

37.07.01.03

13. A relatively high vacuum reading when taking a cranking vacuum test indicates:

a. that your valves are leaking air
b. that the PCV system is plugged
c. that you have back pressure in your crankcase
d. everything is all right

14. When doing a cranking vacuum test, your throttle valve on the carburetor should be:

a. partially open
b. fully open
c. partially closed
d. fully closed

15. At what temperature should an engine be when doing a cranking vacuum test?

a. hot operating range
b. cold operating range
c. normal operating range
d. it doesn't matter what temperature it is

37.07.01.04

16. A leakage past the rings will be audible at the:

a. tail pipe
b. PCV connection
c. carburetor
d. plug hole of cylinder it is leaking from

17. A leak in the exhaust valve can be heard in the:

a. tail pipe
b. carburetor
c. PCV connection
d. plug hole of cylinder it is leaking from

18. While air pressure is retained in the cylinder, listen for escaping air. A leak in the intake valve will be audible in the:

a. carburetor
b. tail pipe
c. PCV connection
d. plug hole of cylinder it is leaking from

37.07.01.05

19. You would brighten terminal posts with a wire brush or:

a. dry cloth
b. knife
c. anything that is handy
d. sandpaper

37.07.01.05 continued

20. You use a wire brush to clean off the bulk of corrosion before you put on:

a. sulphuric acid and water
b. electrolyte and water
c. water
d. baking soda and water

37.07.01.06

21. When doing a battery load test, the 12 volts should not drop below:

a. 9.5 volts
b. 6.5 volts
c. 3.5 volts
d. 4.5 volts

22. When going a battery load test, you drain the battery for how many seconds:

a. 5
b. 15
c. 30
d. 20

23. The battery load test is the procedure of draining the battery amperage at how many times the battery amperage hour rating?

a. 3
b. 4
c. 5
d. 2

37.07.01.07

24. Too much variation in dwell will indicate trouble in the:

a. coil
b. distributor
c. dwell gauge
d. voltage regulator

25. When the engine is running at 1,500 RPM, the dwell should not vary more than:

a. 10 degrees
b. 8 degrees
c. 2 degrees - 3 degrees
d. 7 degrees

26. When setting point gaps, remember that when the gap is enlarged, the point dwell:

a. increases
b. decreases
c. stays the same
d. affects the carburetor

37.07.01.07 continued

27. The number of degrees the cam rotates from the time the points close until they open again is called:

    a. cam angle or dwell
    b. rest space
    c. cam timing
    d. point gap

37.07.01.08

28. Copper wire resistance should not be over how many ohms?

    a. 10
    b. 1
    c. 20
    d. 15

29. The maximum resistance of a carbon wire is how many ohms?

    a. 10 thousand
    b. 15 thousand
    c. 5 thousand
    d. 40-50 thousand

30. To check secondary wiring you hold the adapter how far from a good electrical grounding surface?

    a. 3/4"
    b. 1/2"
    c. 1"
    d. 3/16"

31. To check secondary wiring, disconnect one wire at a time and crank the motor to check:

    a. the starter
    b. the intensity of the spark
    c. the coil
    d. the voltage regulator

32. To determine if the resistance is within specified limits on secondary wries, you use a(n):

    a. hydrometer
    b. voltmeter
    c. ohmmeter
    d. ammeter

37.07.01.09

33. To check the plug wire resistance you use a(n):

a. ammeter
b. voltmeter
c. hydrometer
d. ohmmeter

37.07.01.10

34. You test a plug on the cleaning machine for:

a. broken insulator
b. broken electrode
c. weak spark
d. correct resistance

35. When cleaning plugs, you use a hand wire brush to clean:

a. the insulator
b. the electrodes
c. the threads
d. the plug boot

37.07.01.11

36. When using a timing light, the set of marks used to time a newer model car is usually located where?

a. front crankshaft pully
b. flywheel
c. vibration damper
d. water pump pully

37. What must be done first to be able to check the timing?

a. points have to be set
b. check firing order of engine
c. remove number one spark plug wire
d. remove the coil wire from the distributor cap

38. When timing most cars, you have to remove what on the distributor?

a. number one plug wire
b. vacuum line
c. coil plug wire
d. vacuum advance unit

37.07.01.12

39. When doing a cranking voltage test, you shouldn't crank the starter over:

a. one minute
b. 10 seconds
c. 30 seconds
d. two minutes

40. When you hook a voltmeter across a BAT terminal and the SWITCH terminal on the solenoid, it will detect excessive drop in:

a. the battery circuit
b. the switch circuit
c. the solenoid circuit
d. the starter circuit

41. The allowable voltage drop between the battery and starter in a working model should not exceed:

a. 0.5
b. 0.3
c. 0.2
d. 0.1

42. When doing a cranking voltage test, what kind of voltmeter should you use?

a. a dial indicator
b. a high reading voltmeter
c. a carbon pile voltmeter
d. a low reading voltmeter

37.07.01.13

43. In testing the generator output a safety device installed in the field circuit to control maximum voltage is a:

a. variable resistance unit
b. voltage regulator
c. voltmeter
d. ammeter

44. When checking the charging output of a generator, the engine RPM should not exceed:

a. 1,500 RPM
b. 500 RPM
c. 1,000 RPM
d. 200 RPM

45. The gauges you use when testing the output of a generator are an ammeter, a tachometer and a:

a. hydrometer
b. voltmeter
c. voltage regulator
d. dial indicator

37.07.01.14

46. When you have an open coil primary circuit, the oscilloscope wil. show a reading of:

a. 12
b. 4 to 6
c. 0 to 20
d. 0

47. A pattern indicating a satisfactory coil will show how many thousands of volts on an oscilloscope?

a. 4
b. 12
c. 20
d. 16

48. When testing a coil, you use an oscilloscope to determine the available voltage by comparing which of the following against the kilovolt scale on left side of the scope?

a. waveform
b. ballast resistance
c. carbon tracking
d. flashover

50. To test a cil the temperature should be:

a. any temperature
b. at hot operating temperature
c. at cold operating temperature
d. at normal operating temperature

50. When testing an ignition coil, you are checking for:

a. carbon tracking
b. coil polarity
c. available voltage
d. ballast resistor

UNIT/LAP POST TEST ANSWER KEY: FUNDAMENTALS OF TUNE-UP (B)

1. D
2. C
3. A
4. C
5. A
6. D
7. A
8. A
9. D
10. D
11. A
12. D
13. D
14. D
15. C
16. B
17. A
18. A
19. D
20. D
21. A
22. B
23. A
24. B
25. C
26. B
27. A
28. B
29. D
30. D
31. B
32. C
33. D
34. C
35. C
36. C
37. A
38. B
39. C
40. B
41. A
42. D
43. A
44. A
45. B
46. D
47. C
48. A
49. D
50. C

Standard: _____ File Code: 37.07.01.00.C1-2(C)

Date: _____ Date Published: 5-17-77

UNIT/LAP POST TEST: FUNDAMENTALS OF TUNE-UP (C)

37.07.01.01

1. A condenser that is not properly adjusted can cause:

   a. fouling of the plugs.
   b. fouling of the vacuum advance.
   c. heavy arcing of points.
   d. burning of rotor.

2. Point gap affects:

   a. shell bridging.
   b. splashed fouling.
   c. scavenger deposits.
   d. the coil's available voltage.

3. You should lubricate the distributor cam with:

   a. high temperature grease.
   b. low temperature grease.
   c. light oil.
   d. heavy oil.

*4. Firing order means:

   a. the order in which cylinders fire.
   b. that a piston is top dead center on the firing stroke.
   c. the direction the distributor turns.
   d. that the plugs are clean, gapped and ready to work.

5. Plug fuel fouling is indicated by what color?

   a. reddish brown.
   b. dull gray.
   c. silvery
   d. fluffy, black carbon.

*6. Cam dwell or cam angle means:

   a. the number of degrees of distributor cam rotation from the time the points close until they open.
   b. the angle at which the rubbing block contacts the cam.
   c. the distance between the lobes on the cam.
   d. the number of degrees of distributor cam rotation during the time the points are open.

*(Adapted from Auto Service and Repair, Stockel, Goodheart-Wilcox, 1975, pp. 21-23, #s 10, 15, 18, 28).

37.07.01.01 continued

*7. A normal color for ignition points would be:

a. dull gray.
b. silvery.
c. reddish brown.
d. deep blue.

8. Correct coil polarity can be checked by a:

a. ohmmeter.
b. hydrometer.
c. tachometer.
d. voltmeter.

9. Spark plug center electrode polarity (coil polarity) can be reversed by:

a. reversing the coil to distributor secondary wire.
b. installing larger capacity condenser.
c. installing lower capacity condenser.
d. reversing the primary coil wire connections.

10. Resistance type wire can be easily:

a. refined.
b. burnt.
c. damaged.
d. used on a car for the life of the motor.

37.07.01.02

11. When working a power balance test, the engine operates on how many cylinders at a time?

a. 2.
b. 1.
c. 4.
d. all cylinders but one.

12. In a power balance test you use a vacuum gauge and a:

a. tachometer.
b. compression gauge.
c. combustion efficiency analyzer.
d. load gauge.

*(From Auto Service and Repair, Stockel, Goodheart-Wilcox, 1975, pp. 21-23, #s 10, 15, 18, and 28.)

37.07.01.03

13. When doing a cranking vacuum test, your throttle valve on the carburetor should be:

a. partially open.
b. fully open.
c. partially closed.
d. fully closed.

14. A relatively high vacuum reading when taking a cranking vacuum test indicates:

a. that your valves are leaking air.
b. that the PCV system is plugged.
c. that you have back pressure in your crankcase.
d. everything is all right.

15. At what temperature should an engine be when doing a cranking vaccum test?

a. hot operating range.
b. cold operating range.
c. normal operating range.
d. it doesn't matter what temperature it is.

37.07.01.04

16. While air pressure is retained in the cylinder, listen for escaping air. A leak in the intake valve will be audible in the:

a. carburetor.
b. tail pipe.
c. PCV connection.
d. plug hole of cylinder it is leaking from.

17. A leakage past the rings will be audible at the:

a. tail pipe.
b. PCV connection.
c. carburetor.
d. plug hole of cylinder it is leaking from.

18. A leak in the exhaust valve can be heard in the:

a. tail pipe.
b. carburetor.
c. PCV connection
c. plug hole of cylinder it is leaking from.

37.07.01.05

19. You use a wire brush to clean off the bulk of corrosion before you put on:

a. sulphuric acid and water.
b. electrolyte and water.
c. water.
d. baking soda and water.

7.07.01.05 continued

0. You would brighten terminal posts with a wire brush or:

a. dry cloth.
b. knife.
c. anything that is handy.
d. sandpaper.

7.07.01.06

1. The battery load test is the procedure of draining the battery amperage at how many times the battery amperage hour rating?

a. 3.
b. 4.
c. 5.
d. 2.

2. When going a battery load test, you drain the battery for how many seconds?

a. 5.
b. 15.
c. 30.
d. 20.

3. When doing a battery load test, the 12 volts should not drop below:

a. 9.5 volts.
b. 6.5 volts.
c. 3.5 volts.
d. 4.5 volts.

37.07.01.07.

4. The number of degrees the cam rotates from the time the points close until they open again is called:

a. cam angle or dwell.
b. rest space.
c. cam timing.
d. point gap.

5. Too much variation in dwell will indicate trouble in the:

a. coil.
b. distributor.
c. dwell gauge.
d. voltage regulator.

6. When setting point gaps, remember that when the gap is enlarged, the point dwell:

a. increases.
b. decreases.
c. stays the same.
d. affects the carburetor.

37.07.01.07 continued

27. When the engine is running at 1,500 RPM, the dwell should not vary more than:

a. 10 degrees.
b. 8 degrees.
c. 2 - 3 degrees.
d. 7 degrees.

37.07.01.08

28. To determine if the resistance is within specified limits on secondary wires, you use a(n):

a. hydrometer.
b. voltmeter.
c. ohmmeter.
d. ammeter.

29. Copper wire resistance should not be over how many ohms.

a. 10.
b. 1.
c. 20.
d. 15.

30. To check secondary wiring, disconnect one wire at a time and crank the motor to check:

a. the starter.
b. the intensity of the spark.
c. the coil.
d. the voltage regulator.

31. The maximum resistance of a carbon wire is how many ohms?

a. 10 thousand.
b. 15 thousand.
c. 5 thousand.
d. 40-50 thousand.

32. To check secondary wiring you hold the adapter how far from a good electrical grounding surface?

a. 3/4"
b. 1/2"
c. 1"
d. 3/16"

37.07.01.09

33. To check the plug wire resistance you use a(n):

a. ammeter.
b. voltmeter.
c. hydrometer.
d. ohmmeter.

37.07.01.10.

34. When cleaning plugs, you use a hand wire brush to clean:

a. the insulator.
b. the electrodes.
c. the threads.
d. the plug boot.

35. You test a plug on the cleaning machine for:

a. broken insulator.
b. broken electrode.
c. weak spark.
d. correct resistance.

37.07.01.11

36. When timing most cars, you have to remove what on the distributor?

a. number one plug wire.
b. vacuum line.
c. coil plug wire.
d. vacuum advance unit.

37. When using a timing light, the set of marks used to time a newer model car is usually located where?

a. front crankshaft pully.
b. flywheel.
c. vibration damper.
d. water pump pully.

38. What must be done first to be able to check the timing?

a. points have to be set.
b. check firing order of engine.
c. remove number one spark plug wire.
d. remove the coil wire from the distributor cap.

37.07.01.12

39. When doing a cranking voltage test, what kind of voltmeter should you use?

a. a dial indicator.
b. a high reading voltmeter.
c. a carbon pile voltmeter.
d. a low reading voltmeter.

40. When doing a cranking voltage test, you shouldn't crank the starter over:

a. one minute.
b. 10 seconds.
c. 30 seconds.
d. two minutes.

41. When you hook a voltmeter across a BAT terminal and the SWITCH terminal on the solenoid, it will detect excessive drop in:

a. the battery circuit.
b. the switch cricuit.
c. the solenoid circuit.
d. the starter circuit.

42. The allowable voltage drop between the battery and starter in a working model should not exceed:

a. 0.5.
b. 0.3.
c. 0.2.
d. 0.1.

37.07.01.13

43. The gauges you use when testing the output of a generator are an ammeter, a tachometer and a:

a. hydrometer.
b. voltmeter.
c. voltage regulator.
d. dial indicator.

44. In testing the generator output a safety device installed in the field circuit to control maximum voltage is a:

a. variable resistance unit.
b. voltage regulator.
c. voltmeter.
d. ammeter.

37.07.01.13 continued

45. When checking the charging output of a generator, the engine RPM should not exceed:

a. 1,500 RPM.
b. 500 RPM.
c. 1,000 RPM.
d. 200 RPM.

37.07.01.14

46. When testing an ignition coil, you are checking for:

a. carbon tracking.
b. coil polarity.
c. available voltage.
d. ballast resistor.

47. When you have an open coil primary circuit, the oscilloscope will show a reading of:

a. 12.
b. 4 to 6.
c. 0 to 20.
d. 0.

48. When testing a coil, you use an oscilloscope to determine the available voltage by comparing which of the following against the kilovolt scale on left side of the scope?

a. waveform.
b. ballast resistance
c. carbon tracking.
d. flashover.

49. To test a coil the temperature should be:

a. any temperature.
b. at hot operating temperature.
c. at cold operating temperature.
d. at normal operating temperature.

50. A pattern indicating a satisfactory coil will show how many thousands of volts on an oscilloscope?

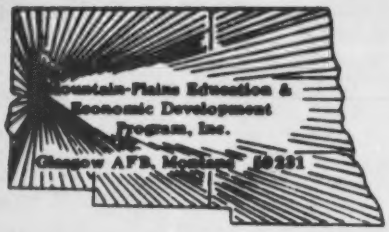
a. 4.
b. 12.
c. 20.
d. 16.

UNIT/LAP POST TEST ANSWER KEY: FUNDAMENTALS OF TUNE-UP (C)

1. C
2. D
3. A
4. A
5. D
6. A
7. A
8. D
9. D
10. C
11. D
12. A
13. D
14. D
15. C
16. A
17. B
18. A
19. D
20. D
21. A
22. B
23. A
24. A
25. B
26. B
27. C
28. C
29. B
30. B
31. D
32. D
33. D
34. C
35. C
36. B
37. C
38. A
39. D
40. C
41. B
42. A
43. B
44. A
45. A
46. C
47. D
48. A
49. D
50. C

Student: _____ File Code: 37.07.01.00.B1-5

Date: _____ Date Published: 3/8/76



Family Pay Number: _____ Sex: M F (Circle 1)

UNIT PERFORMANCE TEST: TEST ENGINE CONDITION

OBJECTIVE:

Test engine condition.

TASK:

The student will be assigned a vehicle on which he will perform engine tests of power balance, cranking vacuum, and cylinder leakage.

ASSIGNMENT:

CONDITIONS:

The student may use only those materials provided for the test and will perform the test in the auto shop.

RESOURCES:

Automobile
Fender covers
"Sun" Electronic tester 920 or 947
Repair Manual
Time and parts manual

RESOURCES (Continued):

Combination Ignition wrench set
Combination Wrench Set
Standard Screwdriver Set
Phillips Screwdriver Set
Feeler gauge - .002 through .025 inch
Hex Key Set
Diagonal Cutting Pliers
Needle Nose Plier
1/4" Drive Socket Set
Ratchet - 3" and 6" extensions - 6" flex handle
Ball Peen hammer
Plastic Tip Hammer
Screw Starter
Chisel and Punch Set
5/32" Pin Punch - 3/16" Solid
Gasket scraper
3/8" Drive Ratchet
3" Extension
Spark Plug Socket
6" Extension
Speed Handle
3/8" Drive Socket Set

Student: _____ File Code: 37.07.01.00.B1-5

Date: _____ Date Published: 3/8/76

Family Pay Number: _____ Sex: M F (Circle 1)

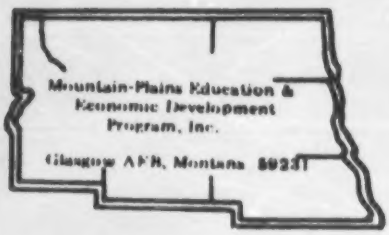
PERFORMANCE CHECKLIST:

OVERALL PERFORMANCE: Satisfactory_____ Unsatisfactory_____

	CRITERION Met	Not Met
Objective:		
1. Perform power balance test.		
Criterion: Compare to manufacturer's specifications.		
2. Perform cranking vacuum test.		
Criterion: Compare to manufacturer's specifications.		
3. Perform cylinder leakage test.		
Criterion: Compare to manufacturer's specifications.		
4. Perform test in allotted time.		
Criterion: Must meet flat rate time on assigned vehicle.		
Student must satisfactorily complete 3 of 4 line items to		
pass test.		

File Code: 37.07.02.00.B1-1

Date Published: 7/15/76



Learning Experience Guide

UNIT: PLUGS AND DISTRIBUTOR

RATIONALE:

The techniques and procedures in this Unit will enable you to diagnose, adjust and repair ignition system components and to diagnose and repair distributors and components.

PREREQUISITES:

None

OBJECTIVE:

Test, adjust and repair ignition system components and recognize the correct procedure for testing, removing, replacing and adjusting of distributor and components.

RESOURCES:

Auto Service and Repair, Martin W. Stockel, Goodheart-Willcox Company, Inc.
Motor's Auto Repair Manual. Motor. The Hearst Corporation. (1972 or equivalent).

Super 8 Sound Films: Universal Education and Visual Arts

Installing External Adjustment Type Contact Points (#7906).
Installing Ignition Points (#7965).
Removing External Adjustment Type Contact Points (#7905).
Removing Ignition Points (#7964).
Replacing Points and Condenser, Pivotless Type (#7907), (#7908).
Replacing the Spark Plug Wire Terminal (#7966).
Spark Plug Services (#7904).
The Spark Plug (#7963).

Automobile with distributor
Automobile needing new points and condenser
Distributor machine
Dwell meter
Fender covers
Ignition distributor
Timing light
Automobile needing: timing adjustment
new spark plugs
spark plug service
secondary ignition cable replacement
Automobile with battery
Baking soda with water or wire brush

Principal Author(s):

Battery cable puller
Compressed air
Fender covers
Grease or post coater
Ohm meter
Point File
Projector
Shop cloth
Spark plug service machine
Tape
Terminal cleaner, battery
Timing light
Tools, basic hand: Chisel and Punch Set
5/32" Pin Punch
3/16" Solid

Gauge, feeler (.002" - .025")

Hammer, ball peen
Hammer, plastic tip
Handle, speed
Hex Key Set

Pliers, diagonal cutting
Pliers, needle nose

Scraper, gasket
Screwdriver, standard (Set)
Screwdriver, phillips (Set)
Screw starter

Socket Set (3/8" drive)
extension (3")
ratchet

Socket Set (1/4" drive)
extension (3")
handle (6" flex)
ratchet

Socket, spark plug
extension (6")

Wrench, combination (Set)
Wrench, combination ignition (Set)

GENERAL INSTRUCTIONS:

This unit consists of four Learning Activity Packages (LAPs). Each LAP will provide specific information for completion of a learning activity.

The general procedure for this Unit is as follows:

1. Read the first assigned Learning Activity Package (LAP).
2. Begin and complete the first assigned LAP.
3. Complete all required LAPs for the Unit.

4. In this Unit, the LAP and Unit test is combined. This combined test is taken after completing the last LAP in the Unit.
5. Take the Unit/LAP test as described in the Unit LEG "Evaluation Procedures".
6. Proceed to the next assigned unit.

PERFORMANCE ACTIVITIES:

.01 Replacing Spark Plugs
.02 Remove and Replace Distributor
.03 Replacing Distributor Points and Condenser
.04 Testing Distributor Advance

EVALUATION PROCEDURE:

When pretesting;

1. The student takes the unit multiple-choice pretest.
2. Successful completion is 4 out of 5 items for each LAP part of the pretest.
3. The student then takes a unit performance test if the unit pretest was successfully completed.
4. Satisfactory completion of the performance test is meeting the criteria listed on the performance test.

When post testing;

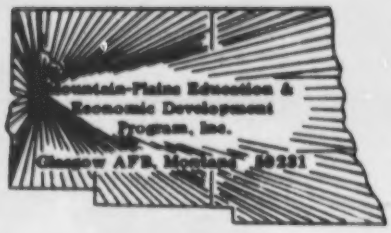
1. The student takes a multiple-choice unit post test and a unit performance test.
2. Successful unit completion is meeting the listed criteria for the performance test.

FOLLOW-THROUGH:

Go to the first assigned Learning Activity Package (LAP) listed on your Student Progress Record (SPR).

Student: _____ File Code: 37.07.02.00.B1-2

Date: _____ Date Published: 3/17/76



UNIT/LAP PRETEST: PLUGS AND DISTRIBUTOR

37.07.02.01.

1. You should clean around a spark plug before removing it by:

   a. washing plug with a solvent.
   b. blowing compressed air around plug.
   c. washing plug with water.
   d. using a wire brush around plug.

2. After the plug is removed from engine, it is advisable to crank the engine for a few seconds in order to:

   a. clean the cylinder.
   b. identify if that plug was fouled.
   c. inspect the arcing of the plug.
   d. worm spark plug up for cleaning.

3. When removing plugs, it is important that you keep them in the correct position (the way they were taken out) so you can:

   a. make sure you get all new plugs in your car.
   b. determine what brand of a plug to use.
   c. find all of the old plugs.
   d. identify the cylinder that is burning incorrectly if plug is fouled.

37.07.02.02.

4. If the distributor run by the oil pump will not bottom, what is wrong?

   a. distributor shaft is not aligned with crank shaft.
   b. distributor shaft is not aligned with cam shaft.
   c. distributor shaft is not aligned with oil pump shaft.
   d. the rotor is 180 degrees off.

37.07.02.03.

5. When installing new points and the alignment is off, you can correct it by:

   a. bending the stationary point bracket.
   b. bending the movable arm on the points.
   c. adding spacing washers to movable arm.
   d. adding spacing washers to stationary point bracket.

37.07.02.03. cont.

6. If the points are too far apart, they will cause:

   a. malfunction of the vacuum diaphragm.
   b. arcing and burning of points.
   c. missing at high speed.
   d. flooding in the carburetor because the gas is not being burnt.

7. Except on GM V8, point gap can be adjusted by a:

   a. pliers.
   b. phillips screw driver.
   c. flat screw driver.
   d. point file.

8. A condenser is used with points to stop:

   a. over gapping of points.
   b. interference in the radio.
   c. breakdown of impedence in points.
   d. heavy arcing of points.

9. If metal is being transferred from the positive point to the negative point, you can remedy it by:

   a. using a coil with less output.
   b. using a condenser of lesser capacity.
   c. using a coil with more output.
   d. using a condenser of greater capacity.

37.07.02.04.

10. On a centrifugal advance mechanism, when checking the performance or timing, you must:

    a. disconnect the vacuum line.
    b. remove the rotor.
    c. have the distributor loose.
    d. advance the distributor until the engine starts to lope.

11.

12. You can adjust the spring tension on a centrifugal advance unit by:

    a. moving the distributor to an advanced position.
    b. bending the post the spring is attached to.
    c. moving the distributor to a retarded position.
    d. replacing the breaker plate assembly.

37.07.02.04. cont.

13.

14. Some vacuum advance units are non adjustable and some you can adjust by:

a. stretching the vacuum spring.
b. adding or removing the spacing washers on the vacuum spring.
c. putting in a stronger vacuum diaphragm.
d. advancing the distributor to compensate for spring loss.

UNIT/LAP PRETEST ANSWER KEY: PLUGS AND DISTRIBUTOR

LAP .01

1. b
2. a
3. d

LAP .02

4. c

LAP .03

5. a
6. c
7. c
8. d
9. d

LAP .04

10. a
11. d
12. b
13. b
14. b

File Code: 37.07.02.01.B1-0

Date Published: 3/8/76

Mountain-Plains Education & Economic Development Program, Inc.
Glasgow AFB, Montana 59231

Learning Activity Package

Student: _____

Date: _____

PERFORMANCE ACTIVITY: Replacement of Spark Plugs

OBJECTIVE:

Demonstrate the correct procedure to replace spark plugs.

EVALUATION PROCEDURE:

80% accuracy on LAP performance.

RESOURCES:

Auto Service and Repair. Stockel.
Motor's Auto Repair Manual.

Automobile needing spark plug replacement
Compressed air
Fender covers
Tools, basic hand: (See Unit LEG)

Filmstrips: Universal Education and Visual Arts

Spark Plug Services (#7904).
The Spark Plug #7963).

PROCEDURE:

NOTE: Read pages 21-23 and 21-29 in Auto Service and Repair.
View filmstrips.

1. Place fender covers.
2. Carefully remove the secondary cables from the spark plugs.
3. Loosen all plugs one-to-two turns.
4. Blow all loose dirt from around spark plugs with air hose.
5. Remove spark plugs and inspect plug condition.
6. Install new plugs carefully to prevent breakage or cross-threading.
7. Tighten spark plugs to the proper torque. (See repair manual for proper torque specifications.)
8. Replace secondary cables or spark plugs. Be sure they are returned exactly as removed. Check the repair manual for the firing order if unsure.
9. Operate engine and check to be sure engine is operating smoothly on all the cylinders.
10. Have the instructor evaluate your work and engine operation.
11. Clean and return all tools and equipment.
12. Proceed to the next LAP.

File Code: 37.07.02.02.B1-0

Date Published: 3/8/76

Mountain-Plains Education & Economic Development Program, Inc.
Glasgow AFB, Montana 59231

Learning Activity Package

Student: _____

Date: _____

PERFORMANCE ACTIVITY: Remove and Replace Distributor

OBJECTIVE:

Use the correct procedure to remove and replace the ignition distributor.

EVALUATION PROCEDURE:

80% correct on LAP performance.

RESOURCES:

Auto Service and Repair. Martin W. Stockel, Goodheart-Willcox Company, Inc.
Motor's Auto Repair Manual. Motor. The Hearst Corporation (1972 or equivalent).

Automobile with a distributor
Fender covers
Timing light
Tools, basic hand: (See Unit LEG)

PROCEDURE:

NOTE: Read pages 21-9 and 21-19 through 21-21 in Auto Service and Repair.

1. Place fender covers on fenders.
2. Remove distributor cap from distributor.
3. Line up rotor with a good mark. Use a nut, notch or terminal for a location mark. Turn engine over with starter to get rotor where you want it.
4. Mark body of distributor primary lead.
5. Remove the distributor primary lead.
6. Disconnect vacuum line from vacuum chamber.
7. Remove distributor hold-down bolt and clamp.
8. Remove distributor from engine.
9. Service the distributor if needed. Be sure engine is not turned over while distributor is out.

Principal Author(s): J. Anderson/W. Osland

10. Install the distributor. Make sure rotor points to same position as when removed.
    NOTE: If installing different distributor, transfer marks from original one to the new.
11. Install hold-down clamp and bolt finger tight.
12. Connect distributor primary lead.
13. Connect vacuum line to vacuum chamber. Be sure fitting is not cross-threaded.
14. Replace distributor cap. Be sure alignment notch is engaged. Snap spring clips into place.
15. Ask instructor to evaluate your work.
16. Remove fender covers.
17. Clean work area and return tools.
18. Go on to the next LAP.

File Code: 37.07.02.03.B1-0

Date Published: 7/15/76

Mountain-Plains Education & Economic Development Program, Inc.
Glasgow AFB, Montana 59231

Learning Activity Package

Student: _____

Date: _____

PERFORMANCE ACTIVITY: Replacing Distributor Points and Condenser

OBJECTIVE:

Demonstrate the correct procedure for replacement of distributor points and condenser.

EVALUATION PROCEDURE:

80% correct on LAP performance.

RESOURCES:

Auto Service and Repair, Stockel.
Motor's Auto Repair Manual.

Filmstrips: Universal Education and Visual Arts

Installing External Adjustment Type Contact Points (#7906).
Installing Ignition Points (#7965).
Removing External Adjustment Type Contact Points (#7905).
Removing Ignition Points (#7964).
Replacing Points and Condenser, Pivotless Type (#7907), (#7908).

Automobile needing the distributor points and condenser replaced
Fender covers
New points and condenser
Tools, basic hand: (See Unit LEG)

PROCEDURE:

NOTE: View filmstrips.
Read pages 21-11 through 21-17 in Auto Service and Repair.

1. Place fender covers on fenders.
2. Open container and remove new point set.
3. Remove distributor cap and rotor from distributor.
4. Disconnect primary wire to points.
5. Remove screw(s) that hold(s) points to breaker plate. Be careful not to drop screw(s). They may fall in base of distributor.
6. Remove screws that hold condenser to breaker plate. Lift out point and condenser assembly.

Principal Author(s): J. Anderson/W. Osland

7. Install new points and condenser. Tighten screws.
8. Replace primary wires. Be sure parts are in correct order.
9. Align points using aligning tool. Bend stationary point only.
10. Check spring tension using tension gauge. Adjust if necessary. Most passenger cars call for 17 to 21 oz. spring tension.
11. Turn distributor shaft until points are open. Fiber block should be peak of cam lobe.
12. Set point gap with proper feeler gauge adjusting so there is just a light drag on feeler gauge blade.
13. Lubricate distributor cam with a small amount of lithium grease.
14. Clean and install rotor and cap.
15. Ask instructor to evaluate your work.
16. Clean and remove tools, equipment and fender covers.
17. Proceed to the next LAP.

File Code: 37.07.02.04.B1-0

Date Published: 3/8/76

Mountain-Plains Education & Economic Development Program, Inc.
Glasgow AFB, Montana 59231

Learning Activity Package

Student: _____

Date: _____

PERFORMANCE ACTIVITY: Testing Distributor Advance

OBJECTIVE:

Demonstrate the correct procedure to test distributor advance mechanisms using the distributor machine.

EVALUATION PROCEDURE:

80% accuracy on LAP performance.

RESOURCES:

Auto Service and Repair. Martin W. Stockel, Goodheart-Willcox Company, Inc.
Motor's Auto Repair Manual. Motor. The Hearst Corporation (1972 or equivalent).

Distributor machine
Fender covers
Ignition distributor
Tools, basic hand: (See Unit LEG)

PROCEDURE:

NOTE: Read page 21-18 in Auto Service and Repair.

1. Clean and dry distributor body and shaft.
2. Place distributor on distributor machine following machine instructions for hook-up.
3. Set the zero of the degree ring in line with the nearest arrow flash. Manufacturer's specifications should be referred to for proper speeds and advance readings.
4. Increase distributor speed, pausing at each specified speed.
5. Momentarily exceed the highest speed given. Return speed to zero, rechecking at each speed. See if advance speed is the same as before.
   NOTE: Refer to repair manual for service procedures.
6. Insert proper fitting in the vacuum unit and tighten.

Principal Author(s): J. Anderson/W. Osland

7. Place thumb on end of vacuum hose and turn pump on. Adjust vacuum to 20 inches.
   NOTE: Remove and replace thumb several times to assure proper adjustment.
8. Apply hose to vacuum advance unit. Gauge should again read 20 inches.
   NOTE: If reading is not 20 inches, there is a leak in vacuum diaphragm. Vacuum chamber must be replaced.
9. Apply no vacuum to the unit. Set the zero of the degree ring in line with arrow.
10. Increase vacuum to the points specified by repair manual. Note amount of advance.
11. Recheck on decreasing vacuum at each point. Observe smoothness of plate action.
    NOTE: Refer to manual service recommendations.
12. Reduce tester speed to zero. Turn all switches to OFF.
13. Record results on the work order.
14. Ask the instructor to evaluate your work.
15. Clean and return all equipment.
16. Proceed to the next LAP.

Student: _____ File Code: 37.07.02.00.C1-2

Date: _____ Date Published: 3/18/76

UNIT/LAP POST TEST: PLUGS AND DISTRIBUTOR A

37.07.02.01.

1. You should clean around a spark plug before removing it by:

   a. washing plug with a solvent.
   b. blowing compressed air around plug.
   c. washing plug with water.
   d. using a wire brush around plug.

2.

3. When tightening plugs, it is important to have the correct torque. If you don't have enough torque, it will cause:

   a. post-ignition.
   b. plug to underheat.
   c. a change of gap.
   d. plug to overheat.

37.07.02.02.

4. You can bottom the distributor by pushing on it while you:

   a. lightly tap the distributor with a soft face hammer.
   b. draw the hold down clamp tight.
   c. move the rotor around.
   d. crank the engine.

5. If the engine was cranked after the distributor was removed, you can adjust the engine and distributor by:

   a. having the number one cylinder on top dead center compression stroke and rotor pointing to number one spark plug hole.
   b. turning the engine so that the number one cylinder is ready to fire, and placing rotor toward number one cap tower on distributor.
   c. mounting the distributor and moving the wires till you have the right firing order.
   d. having the timing marks aligned on the exhaust stroke of number one and the rotor pointing to number one wire.

37.07.02.03.

6. When installing new points and the alignment is off, you can correct it by:

   a. bending the stationary point bracket.
   b. bending the movable arm on the points.
   c. adding spacing washers to movable arm.
   d. adding spacing washers to stationary point bracket.

7. The point gap when installing points is critical. If you have the points set too close together, it will cause:

   a. interference with the working of the carburetor.
   b. reduction of the dwell angle.
   c. missing at high speeds.
   d. excessive/dwell.

8. To set points, the cam on the distributor has to be:

   a. it doesn't matter where the cam is.
   b. on the lowest part of the cam when touching the rubbing block.
   c. on the highest tip touching the arm of the rubbing block.
   d. parallel to the breaker plate assembly.

9. The normal color of points when used properly is:

   a. black.
   b. light gray.
   c. shining silver.
   d. reddish brown.

10. Contact points are made of:

   a. aluminum carbon steel.
   b. stainless steel.
   c. spring steel.
   d. tungesten steel.

37.07.02.04.

11. On a centrifugal advance mechanism, when checking the performance or timing, you must:

   a. disconnect the vacuum line.
   b. remove the rotor.
   c. have the distributor loose.
   d. advance the distributor until the engine starts to lope.

12.

37.07.02.04. cont.

13. You can adjust the spring tension on a centrifugal advance unit by:

    a. moving the distributor to an advanced position.
    b. bending the post the spring is attached to.
    c. moving the distributor to a retarded position.
    d. replacing the breaker plate assembly.

14. Some vacuum advance units are non adjustable and some you can adjust by:

    a. stretching the vacuum spring.
    b. adding or removing the spacing washers on the vacuum spring.
    c. putting in a stronger vacuum diaphragm.
    d. advancing the distributor to compensate for spring loss.

UNIT/LAP POST TEST:ANSWER KEY: PLUGS AND DISTRIBUTOR

LAP .01

1. b
2. [redacted]
3. d

LAP .02

4. d
5. b

LAP .03

6. a
7. d
8. c
9. b
10. d

LAP .04

11. a
12. [redacted]
13. b
14. b

Grading: _____ File Code: 37.07.02.00.C1-2 (B)

Date: _____ Date Published: 5-20-77

UNIT/LAP TEST: PLUGS AND DISTRIBUTOR (B)

37.07.02.01

1. When tightening plugs, it is important to have the correct torque. If you don't have enough torque, it will cause:

   a. post-ignition.
   b. plug to underheat.
   c. a change of gap.
   d. plug to overheat.

2. You should clean around a spark plug before removing it by:

   a. washing plug with a solvent.
   b. blowing compressed air around plug.
   c. washing plug with water.
   d. using a wire brush around plug.

37.07.02.02

3. If the engine was cranked after the distributor was removed, you can adjust the engine and distributor by:

   a. having the number one cylinder on top dead center compression stroke and rotor pointing to number one spark plug hole.
   b. turning the engine so that the number one cylinder is ready to fire, and placing rotor toward number one cap tower on distributor.
   c. mounting the distributor and moving the wires till you have the right firing order.
   d. having the timing marks aligned on the exhaust stroke of number one and the rotor pointing to number one wire.

4. You can bottom the distributor by pushing on it while you:

   a. lightly tap the distributor with a soft face hammer.
   b. draw the hold down clamp tight.
   c. move the rotor around.
   d. crank the engine.

37.07.02.03

5. Contact points are made of:

   a. aluminum carbon steel.
   b. stainless steel.
   c. spring steel.
   d. tungesten steel.

37.07.02.03

6. The normal color of points when used properly is:

   a. black.
   b. light gray.
   c. shining silver.
   d. reddish brown.

7. To set points, the cam on the distributor has to be:

   a. it doesn't matter where the cam is.
   b. on the lowest part of the cam when touching the rubbing block.
   c. on the highest tip touching the arm of the rubbing block.
   d. parallel to the breaker plate assembly.

8. The point gap when installing points is critical. If you have the points set too close together, it will cause:

   a. interference with the working of the carburetor.
   b. reduction of the dwell angle.
   c. missing at high speeds.
   d. excessive/dwell.

9. When installing new points and the alignment is off, you can correct it by:

   a. bending the stationary point bracket.
   b. bending the movable arm on the points.
   c. adding spacing washers to movable arm.
   d. adding spacing washers to stationary point bracket.

37.07.02.04

10. Some vacuum advance units are non-adjustable and some you can adjust by:

   a. stretching the vacuum spring.
   b. adding or removing the spacing washers on the vacuum spring.
   c. putting in a stronger vacuum diaphragm.
   d. advancing the distributor to compensate for spring loss.

11. You can adjust the spring tension on a centrifugal advance unit by:

   a. moving the distributor to an advanced position.
   b. bending the post the spring is attached to.
   c. moving the distributor to a retarded position.
   d. replacing the breaker plate assembly.

12. On a centrifugal advance mechanism, when checking the performance or timing, you must:

   a. disconnect the vacuum line.
   b. remove the rotor.
   c. have the distributor loose.
   d. advance the distributor until the engine starts to lope.

UNIT/LAP POST TEST ANSWER KEY: PLUGS AND DISTRIBUTOR (B)

1. D
2. B
3. B
4. D
5. D
6. B
7. C
8. D
9. A
10. B
11. B
12. A

Student: _____ File Code: 37.07.02.00.C1-2(C)

Date: _____ Date Published: 5-23-77

UNIT/LAP TEST: PLUGS AND DISTRIBUTOR (C)

37.07.02.01

1. You should clean around a spark plug before removing it by:

   a. washing plug with a solvent.
   b. blowing compressed air around plug.
   c. washing plug with water.
   d. using a wire brush around plug.

2. When tightening plugs, it is important to have the correct torque. If you don't have enough torque, it will cause:

   a. post-ignition
   b. plug to underheat.
   c. a change of gap.
   d. plug to overheat.

37.07.02.02

3. You can bottom the distributor by pushing on it while you:

   a. lightly tap the distributor with a soft face hammer.
   b. draw the hold down clamp tight.
   c. move the rotor around.
   d. crank the engine.

4. If the engine was cranked after the distributor was removed, you can adjust the engine and distributor by:

   a. having the number one cylinder on top dead center compression stroke and rotor pointing to number one spark plug hole.
   b. turning the engine so that the number one cylinder is ready to fire, and placing rotor toward number one cap tower on distributor.
   c. mounting the distributor and moving the wires till you have the right firing order.
   d. having the timing marks aligned on the exhaust stroke of number one and the rotor pointing to number one wire.

37.07.02.03

5. The point gap when installing points is critical. If you have the points set too close together, it will cause:

   a. interference with the working of the carburetor.
   b. reduction of the dwell angle.
   c. missing at high speeds.
   d. excessive/dwell.

37.07.02.03 (continued)

6. When installing new points and the alignment is off, you can correct it by:

   a. bending the stationary point bracket.
   b. bending the movable arm on the points.
   c. adding spacing washers to movable arm.
   d. adding spacing washers to stationary point bracket.

7. Contact points are made of:

   a. aluminum carbon steel.
   b. stainless steel.
   c. spring steel.
   d. tungesten steel.

8. The normal color or points when used properly is:

   a. black.
   b. light gray.
   c. shining silver.
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9. To set points, the cam on the distributor has to be:

   a. it doesn't matter where the cam is.
   b. on the lowest part of the cam when touching the rubbing block.
   c. on the highest tip touching the arm of the rubbing block.
   d. parallel to the breaker plate assembly.

37.07.02.04

10. On a centrifugal advance mechanism, when checking the performance or timing, you must:

    a. disconnect the vacuum line.
    b. remove the rotor.
    c. have the distributor loose.
    d. advance the distributor until the engine starts to lope.

11. Some vacuum advance units are non-adjustable and some you can adjust by:

    a. stretching the vacuum spring.
    b. adding or removing the spacing washers on the vacuum spring.
    c. putting in a stronger vacuum diaphragm.
    d. advancing the distributor to compensate for spring loss.

12. You can adjust the spring tension on a centrifugal advance unit by:

    a. moving the distributor to an advnaced position.
    b. bending the post the spring is attached to.
    c. moving the distributor to a retarded position.
    d. replacing the breaker plate assembly.

UNIT/LAP POST TEST ANSWER KEY: PLUGS AND DISTRIBUTOR (C)

1. B
2. D
3. D
4. B
5. D
6. A
7. D
8. B
9. C
10. A
11. B
12. B